

A Revision of *Bephrata* and *Isosomodes* (Hymenoptera: Eurytomidae)

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Abstract.—The genera *Bephrata* Cameron and *Isosomodes* Ashmead are redefined and redescribed. Twenty-two species are described as new: *B. atra*, *B. bouceki*, *B. camacho*, *B. chica*, *B. christeri*, *B. citri*, *B. clava*, *B. flava*, *B. leptogaster*, *B. lorraineae*, *B. nigracephala*, *B. noyesi*, *B. nublada*, *B. petiolata*, *B. stichogaster*, *B. ticos*, *I. azofiefai*, *I. landoni*, *I. paradoxus*, *I. parkeri*, *I. colombia*, and *I. similis*. Previous nominal species are redescribed: *B. bahiae* (Ashmead), *B. cultriformis* (Ashmead), *B. ruficollis* Cameron, *I. gigantea* (Ashmead), and *I. nigriceps* Ashmead. One new synonymy is proposed: *I. brasiliensis* Ashmead 1904 with *I. gigantea* (Ashmead 1886), **n. syn.** Keys are provided for separating the species in each genus. Available evidence suggests that the species in these two genera are egg parasitoids of Tettigoniidae (Orthoptera).

Key words.—*Bephrata*, *Isosomodes*, Eurytomidae, egg parasitoids, Tettigoniidae, orchids

In their phylogenetic analysis of the Eurytominae (Eurytomidae), Lotfalizadeh et al. (2007) recognized the *Bephrata* genus group as one of the basal clades in the subfamily. Among the more readily observable characteristics they cited for characterizing this group are elongate body with a flattened scutellum, subcircular head (in frontal view) with short malar space and torus situated well above lower eye margin, stigmal vein almost as long as, to slightly longer than, marginal vein and forming an acute angle (40° or less) with the postmarginal vein, and the postmarginal vein is nearly always longer than the marginal vein.

The *Bephrata* genus group includes *Bephrata* Cameron and *Isosomodes* Ashmead, both of which are known principally from the New World. Lotfalizadeh et al. (2007: 470) synonymized *Aximogastra* Ashmead with *Bephrata*. Carefully examining their appendix 2 (p. 508), "*Bephrata* Cameron 1884" is neither in bold type nor set off from the preceding treatment of *Aximopsis* and its synonyms. Upon rapid scanning of

the appendix, it might appear that *Aximogastra* was synonymized erroneously with *Aximopsis* Ashmead when this is not the case. In any event, the type species of *Aximogastra* (*A. bahiae* Ashmead) is explicitly combined with *Bephrata* on page 509 (Lotfalizadeh et al. 2007), implicitly synonymizing the two genera.

The three nominal species of *Bephrata* described from southern Asia (*B. dalhousiensis* Mukerjee, *B. kumaoensis* Mukerjee, *B. nepalensis* Mukerjee (Mukerjee 1981)) do not appear congeneric with the type species (*B. ruficollis* Cameron) from the Neotropics based on the written descriptions and illustrations, but we have not examined those species. Lotfalizadeh et al. (2007) mention an undescribed species of *Bephrata* (cited as *Aximogastra*) from Guinea, and thus this genus apparently is present in the Old World. Although the biologies of *Bephrata* and *Isosomodes* are poorly known, the available evidence indicates that they are parasitoids of eggs of Tettigoniidae (Orthoptera), specifically *Bucrates capitatus* (De Santis 1989) plus

Table 1. Morphological differences between *Bephrata* and *Isosomodes*.

	<i>Bephrata</i>	<i>Isosomodes</i>
Sculpture of lower face	With radiating striae	Without radiating striae
Intertricular space*	Less than torular diameter; compressed above into laminate projection	Greater than torular diameter; angulate above
Last two flagellomeres of female	Separated, never wider than preceding flagellomeres	Appressed, sometimes slightly wider than preceding flagellomeres
Apex of male scape	With light colored oval area; absent in <i>B. leptogaster</i>	Without light colored oval area
Posterior genal margin*	Usually carinate; ecarinate in <i>B. clava</i> and <i>B. cultriformis</i>	Ecarinate
Subforaminal plate on postgenal bridge*	Discoid plate absent	Discoid plate present, but not well delimited medially
Notauli and axillular grooves*	Evident to mostly obliterated	Obliterated
Angle between dorsal surface of scutellum and propodeum	Variable, but often less than 135 degrees	Greater than 135 degrees
Procoxa*	With oblique groove at base of anterior surface; absent in <i>B. clava</i> and <i>B. cultriformis</i>	Without oblique groove on anterior surface
Marginal vein*	> stigmal vein	< stigmal vein
Hypopygium*	Usually extending beyond middle of gaster	Not reaching middle of gaster
Number of pairs of setae at apex of hypopygium	5–18, except in <i>B. citri</i>	2–4 pairs

* = characters listed by Lotfalizadeh et al. 2007

Bucrates sp. and *Tettigonia* sp. (Herting 1973). A sample of tettigoniid (Pseudophyllinae) eggs obtained by PH yielded a rearing record for *B. citri*, *n. sp.*

Lotfalizadeh et al. (2007) listed six apomorphies for *Bephrata* (and *Aximogastrea*) and three for *Isosomodes*. These are given in Table 1, together with some additional characters for distinguishing the two genera. Because most of the tabulated differences include a few exceptions, we have used a combination of characters to characterize these two genera. In the New World, *Bephrata* includes three nominal species: *B. ruficollis* Cameron, *B. cultriformis* Ashmead, and *B. bahiae* (Ashmead). *Isosomodes* also included three nominal species: *I. gigantea* (Ashmead), *I. brasiliensis* Ashmead, and *I. nigriceps* Ashmead. Here we describe 16 new species of *Bephrata*, six new species of *Isosomodes*, and propose one new synonymy (*I. brasiliensis* with *I. gigantea*), thus bringing the total number of species in the New World to 19 and 8, respectively.

MATERIALS AND METHODS

Descriptions of species are based on the female holotypes. Two species were originally described based on males: *I. gigantea* and *I. nigriceps*. Structures not visible on the holo- or lectotype but shown in the figures are indicated by brackets [].

Specimen examination and preparation: Specimens in ethanol were dehydrated through increasing concentrations of ethanol to HMDS (Heraty and Hawks 1998) before point or card mounting. Images of specimens were produced by scanning electron microscopy (SEM) and an EntoVision Imaging Suite. A Nikon SMZ1500 stereomicroscope with 10× oculars (Nikon C-W10X/22) and a Chiu Technical Corp. Lumina 1 FO-150 fiber optic light source was used for card- and point-mounted specimen observation. Mylar film was placed over the ends of the light source to reduce glare. Scanning electron microscope (SEM) images were taken with an Amray 1810 (LaB₆ source). Some specimens were cleaned of external debris with bleach and

distilled water following Bolte (1996) and affixed to 12.7× 3.2 mm Leica/Cambridge aluminum SEM stubs with carbon adhesive tabs (Electron Microscopy Sciences, #77825-12). Stub-mounted specimens were sputter coated using a Cressington Scientific 108 Auto with a gold-palladium mixture from at least three different angles to ensure complete coverage (~20–30 nm coating). Color images were obtained using an EntoVision Imaging Suite, which includes a firewire JVC KY-75 3CCD digital camera mounted to a Leica M16 zoom lens via a Leica z-step microscope stand. This system fed image data to a desktop computer where Cartograph 5.6.0 (Microvision Instruments, France) was used to capture a fixed number of focal planes (based on magnification); the resulting focal planes were merged into a single, in-focus composite image. Uniform lighting was achieved using a LED illumination dome with all four quadrants set to 99.6% intensity. Terminology generally follows that of Gibson et al. (1997), except for a few terms from Lotfalizadeh et al. (2007), such as intertorular space (instead of interantennal space), adscrobal carina (anterior border of femoral depression), epicnemium (instead of mesepisternum), and characters on the posterior surface of the head. These latter characters were not examined for all species and are reported in the generic descriptions based upon the taxa for which they were observed (*B. ruficollis*, *I. azofiefai*, *I. similis*). Specimen with data labels similar to "COSTA RICA INBioCRI000645008" (numeric suffix differs) have been barcoded by INBio. Terminology for surface sculpture (e.g. nitid = shiny) follows that of Harris (1979). Abbreviations for collections are BMNH (The Natural History Museum, London), CNC (Canadian National Collection, Ottawa), INBio (Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica), IAVH (Instituto Alexander von Humboldt, Bogotá, Colombia), MZCR (Museo de Zoología, Universidad de Costa Rica), and

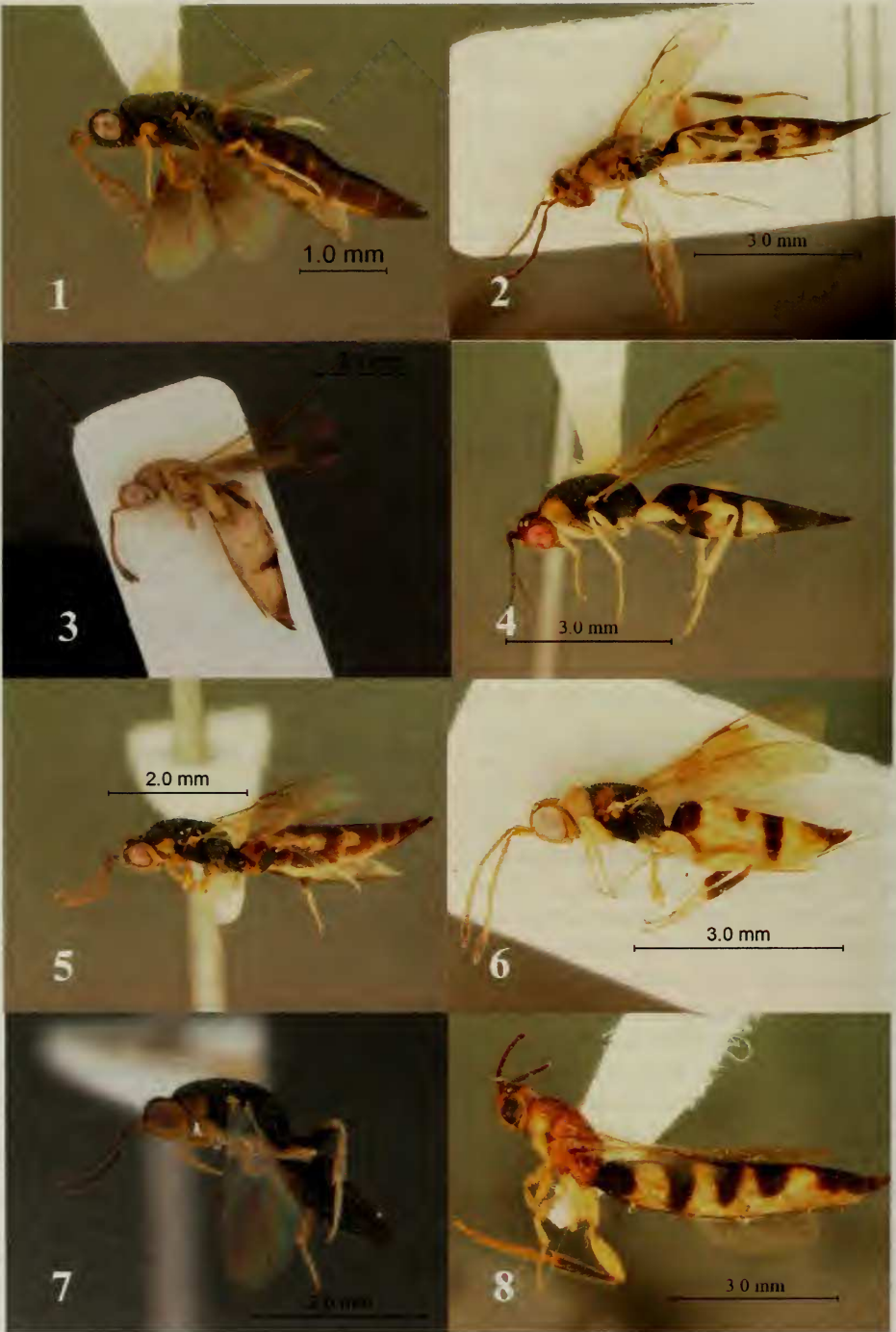
USNM (National Museum of Natural History, Washington, D.C.). Materials from Ecuador are held on indefinite loan from Escuela Polytechnica Nacional, Quito, Ecuador (EPNC). In 1999, Napo province in Ecuador was subdivided by the creation of Orellana province from the eastern ¼ of the former Napo province. Label data reported herein reflect Napo province as previously defined, given dates of collection. Lectotypes established herein, in accordance with Article 74.7.3 (ICZN 1999), are designated in order to ensure nomenclatural stability.

Bephrata Cameron

Bephrata Cameron 1884:109. Type species: *Bephrata ruficollis* Cameron, by monotypy.

Aximogastra Ashmead 1904: 261. Type species: *Aximogastra bahiae* Ashmead, by monotypy. Synonymy by Lotfalizadeh et al. 2007: 508.

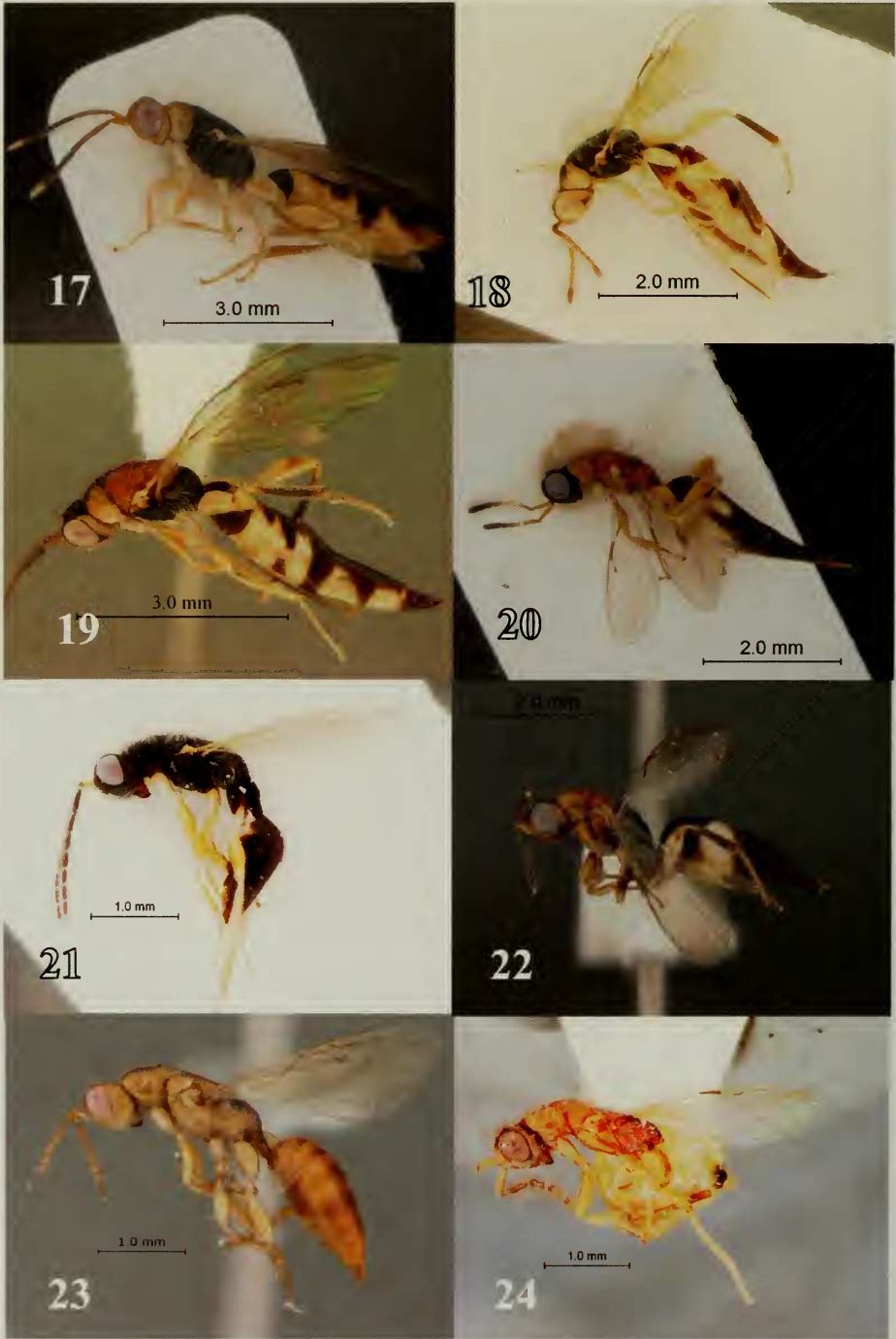
Description (females).—Length 3.2–8.3 mm. Color: Usually a combination of yellow (or orange/reddish yellow) and black, mostly black in *B. atra*, *B. chica*, *B. citri*, and *B. nigracephala*; middle terga of gaster often with black band along posterior margin (appearing like vertical tiger stripes), becoming weaker ventrally (Figs. 1–19). *Sculpture*: Head (except gena), dorsal mesosoma, lateral and posterior part of epicnemium, metapleuron, and lateral areas of propodeum covered with setigerous foveae ('umbilicate punctures'), interstices appearing microreticulate at low magnification (Fig. 28); supraclypeal area with striae converging on clypeus (Fig. 29), gena and lateral panel of pronotum weakly sculptured, coriarius-substrigulate; prepectus weakly sculptured, shallowly concave along dorsoventral axis; femoral depression coriarius and/or substrigulate, mesepimeron less sculptured (Fig. 30); metepimeron and lateral areas of propodeum more strongly sculptured (deeply foveate to alveolate) than rest of body; coxae weakly sculptured, outer surface of metacoxa coriarius; metatibia



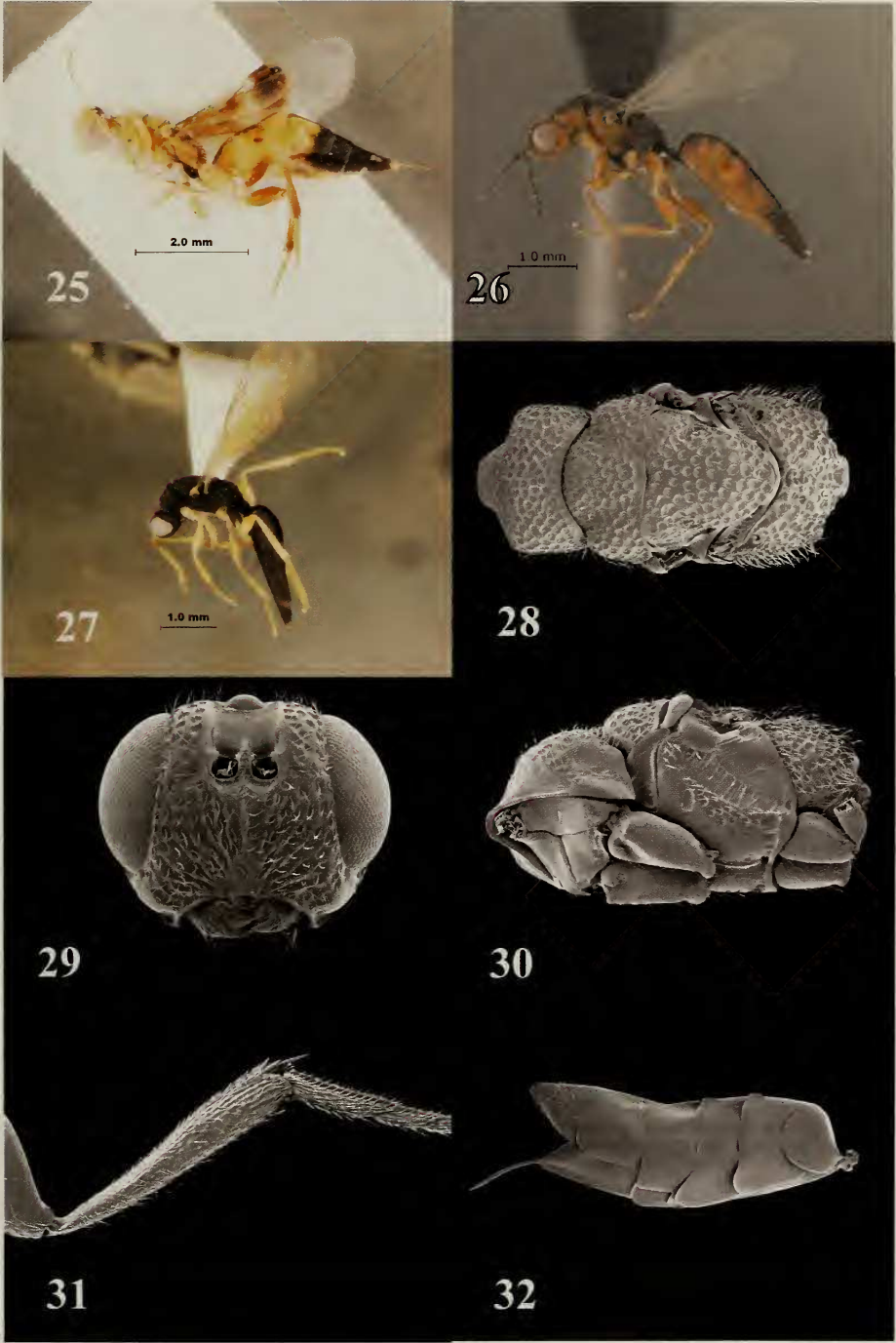
Figs 1-8. 1, *Bephrata atra*, habitus; 2, *B. bahiae*, habitus; 3, *B. bouceki*, habitus; 4, *B. camacho*, habitus; 5, *B. chica*, habitus; 6, *B. christeri*, habitus; 7, *B. citri*, habitus; 8, *B. clava*, habitus.



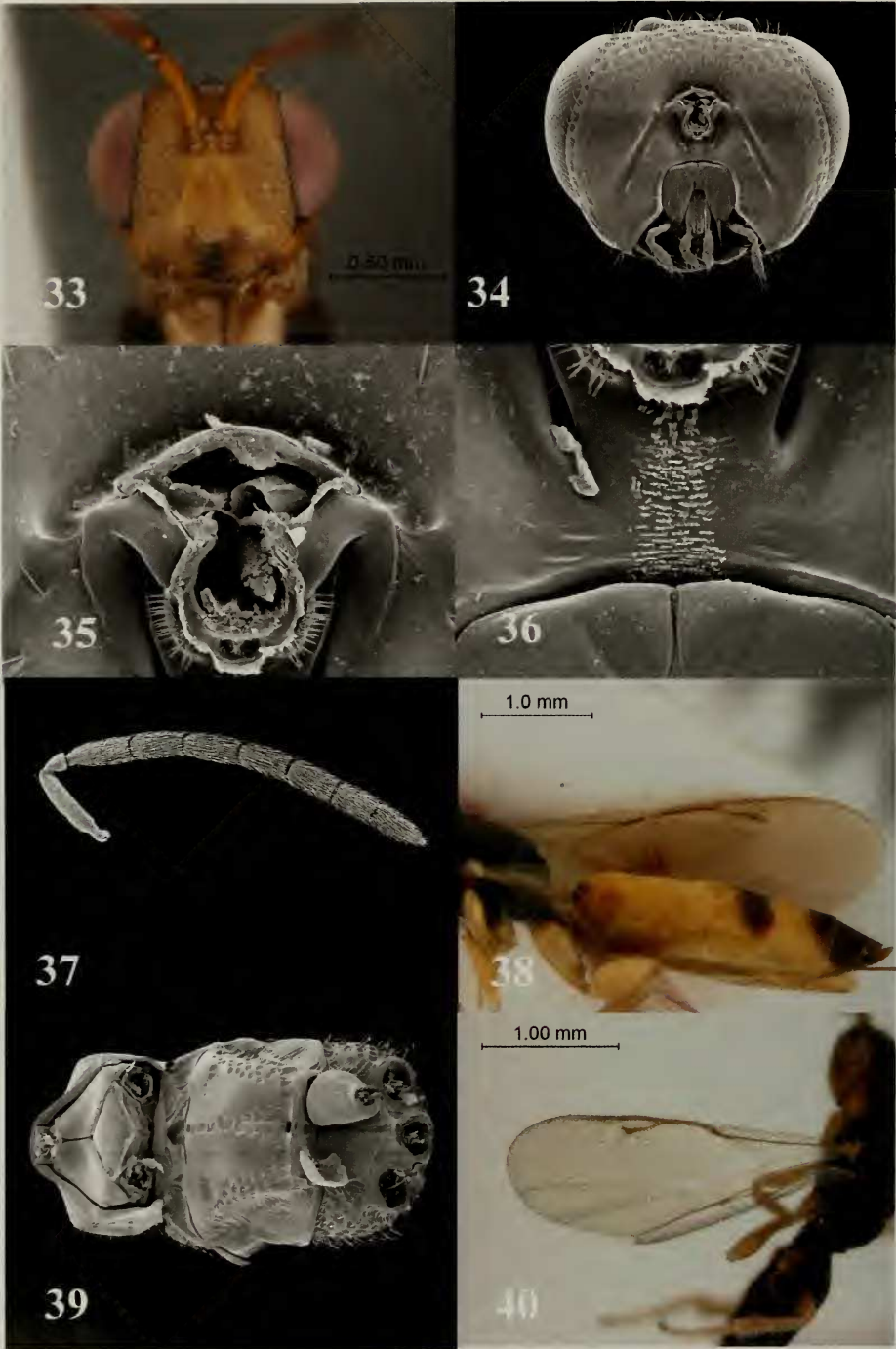
Figs 9–16. 9, *Bephrata cultriformis*, habitus; 10, *B. flava*, habitus; 11, *B. leptogaster*, habitus; 12, *B. lorraineae*, habitus; 13, *B. nigracephala*, habitus; 14, *B. noyesi*, habitus; 15, *B. nublada*, habitus; 16, *B. petiolata*, habitus.



Figs 17–24. 17, *Bephrata ruficollis*, habitus; 18, *B. stichogaster*, habitus; 19, *B. ticos*, habitus; 20, *I. azofiefai*, habitus; 21, *I. gigantea*, habitus; 22, *I. colombia*, habitus; 23, *I. landoni* habitus; 24, *I. nigriceps*, habitus.



Figs 25–32. 25, *Isosmodes paradoxus*, habitus; 26, *I. parkeri*, habitus; 27, *I. similis*, habitus; 28, *B. ruficollis*, dorsal mesosoma; 29, *B. ruficollis*, anterior head; 30, *B. ruficollis*, lateroventral mesosoma; 31, *B. camacho*, metatibia; 32, *B. ruficollis*, lateral gaster.



Figs 33–40. 33, *Bephrata ruficollis*, anterior head; 34, *B. ruficollis*, posterior head; 35, *B. ruficollis*, foramen magnum; 36, *B. ruficollis*, postgenal bridge; 37, *B. ruficollis*, female antenna; 38, *B. ruficollis*, fore wing and gaster; 39, *B. ruficollis*, ventral mesosoma; 40, *B. citri*, fore wing.



Figs 41–48. 41, *Bephrata camacho*, lateral gaster; 42, *B. noyesi*, male antenna; 43, *B. lorraineae*, male scape; 44, *B. leptogaster*, male antenna; 45, *B. azofiefai*, male antenna; 46, *B. ruficollis*, male antenna; 47, *B. cultriformis*, no genal carina; 48, *B. cultriformis*, procoxae.

appearing longitudinally rugose from presence of raised, elongate carinae (Fig. 31); metasoma nitid, often finely imbricate posteriorly (Fig. 32). Head: Slightly wider than high in frontal view; mandible with two pointed teeth ventrally and a truncate tooth dorsally; anterior clypeal margin straight (Fig. 29); torus situated above middle of eye and antennal scape often extending above vertex; intertorular space narrow, with a semicircular plate (in lateral view; Fig. 33) extending to base of scape, continuing as raised lineation in middle of scrobal basin but becoming very weak and often difficult to discern dorsally; scrobal basin very weakly sculptured, carinate laterally; anterior ocellus situated adjacent to scrobal basin, usually separated by a transverse lineation; malar sulcus weak, usually only evident at ventral and dorsal end; gena convex, genal carina usually present, at least ventrally (absent in two species; see Comments). Antennal scape relatively short, not much longer than first funicular segment, anellus very small, funicular segments much longer than wide; clava with 3 fused segments; first funicular segment slightly tapered at base; funicular segments and clava with 2–4 irregular, overlapping rows of longitudinal sensilla (MPS), covered with subdecumbent setae, about $0.8\times$ width of corresponding segment; apex of clava with fine 'crown' of microsetae (Fig. 37). Posterior surface of head with lateral foraminal plates distinct dorsally and laterally and extend to mid length of postgenal bridge sulci; postgenal bridge sulci deep and complete, bridge ornamented with digitiform cuticular expansions, postgenal present, straight, indistinct dorsally, postgenal lamina absent (Figs. 34–36). Mesosoma: About twice as long as wide (length $1.8\text{--}2.3\times$ width), dorsal surface straight in lateral view, scutellum flat (Fig. 38), propodeum usually sloping steeply ventrally; notauli variable but not deep; axillular groove often obliterated, sometimes evident as row of foveae or weak line; lateral

surface of prepectus triangular, narrow posteriorly, with posterior corner rounded; subventral carina of prepectus visible in lateral view; epicnemium in lateral view broad and evenly curved, without a differentiated mesopleural shelf (simple transverse carina in front of mesocoxae; Fig. 39); femoral depression of mesopleuron shallowly concave, usually demarcated anteriorly by adscrobal carina (rarely absent). Procoxa usually convex anteriorly, laminate anteroapically, basal anterior surface usually with a broad, oblique, channel-like depression (for reception of lower head), bordered mesally by a carina (Fig. 30) (depression and carina absent in two species; see Comments); metafemur about $3\times$ as long as wide; metatibia with two apical spurs, the shorter spur usually pointed (like the longer spur), but blunt in two species (see Comments). Fore wing with postmarginal vein longer than marginal vein, stigmal vein slightly shorter than marginal vein, speculum and basal cell setose (like rest of wing) (Figs. 38, 40). Metasoma: Petiole asetose, usually wider than long (quadrate in *B. noyesi*; elongate in *B. nigracephala* and *B. petiolata*); gaster elongate (length $2.2\text{--}6.9\times$ height), weakly sclerotized, [collapsing and strongly compressed laterally in dried specimens]; gastral terga 1–5 usually somewhat similar in length; hypopygium nearly always reaching beyond midlength of gaster, often nearly to apex, ventral line with 5–18 pairs of setae (Figs. 32, 41); ovipositor sheaths tilted upward at apex, terminating behind Gt7.

Males.—Presently unknown in four of nineteen species: *B. atra*, *B. citri*, *B. nigracephala*, and *B. petiolata*. Usually slightly smaller, darker (especially the gaster) than female. Antennal scape with small, light-colored oval area at apex (opposite insertion of pedicel), which may or may not be situated on a knoblike projection (Figs. 42, 43) (depending on species), but oval area absent in *B. leptogaster* (Fig. 44); flagellomeres narrowed at each end, with elongate setae at least $2\text{--}3\times$ width of flagellomere

(Fig. 45), except in *B. ruficollis*, which has shorter and more dense setae (Fig. 46).

Comments.—*Bephrata clava* and *B. cultriformis* lack the genal carina and procoxal depression (the two characters probably being functionally related; Figs. 47, 48), as in *Isosomodes*. These two species have the metatibia with the short apical spur blunt (instead of pointed; Fig. 49), unlike any other species of *Bephrata* or *Isosomodes*, except males of *B. leptogaster*, which are anomalous in other characters (the antennal scape and sculpturing of the mesosoma). In all other characters examined *B. clava* and *B. cultriformis* resemble other *Bephrata*. The number of setae on the apex of the hypopygium is a fairly reliable and previously unreported means of separating *Bephrata* (5 or more pairs of setae) from *Isosomodes* (3–4 pairs); the only exception is *B. citri*, which appears to have only three pairs of setae, although this is based on one specimen (the only specimen with an exposed hypopygium).

Biology.—The specimens examined were collected by Malaise trap, hand net, canopy fogging and, less commonly, yellow pan traps; none were collected at lights. The

only host record is for *B. citri*, which emerged from eggs of Pseudophyllinae (Orthoptera: Tettigoniidae) inserted into a citrus branch (Fig. 50). *Bephrata chica*, *B. leptogaster*, *B. lorraineae*, and *B. stichogaster* included specimens that were intercepted at ports-of-entry into the United States in association with orchids (*Cattleya*, *Laelia*), suggesting that they emerged from host eggs (possibly tettigoniid) in these plants. An intercepted specimen of *B. camacho* was reared from a palm (*Chamaedorea*) stem; one specimen of *B. stichogaster* was associated with *Philodendron* (Araceae) stems and one *B. chica* with bromeliads. With respect to phenology, the available information suggests that species of *Bephrata* show little seasonality with respect to adult activity. Two of the most common species in Costa Rica, *B. camacho* and *B. ruficollis*, have been collected every month of the year.

Distribution.—In the New World, species of *Bephrata* have been collected from Mexico (Vera Cruz) to Brazil (Amazonas, Bahia). They occur primarily in the lowlands with some species occurring at mid-altitudes (up to 1500 m); in Costa Rica no specimens have been collected above 1600 m.

KEY TO SPECIES OF BEPHRATA

1	Procoxa without sinuous groove on anterior surface (Fig. 48); metatibia with shorter apical spur peglike (Fig. 49) and metatarsus with first tarsomere about as long as combined length of remaining tarsomeres.	2
–	Procoxa with sinuous groove on anterior surface (Fig. 30); metatibia with shorter apical pointed spur (similar to longer spur) and metatarsus with first tarsomere usually longer than combined length of remaining tarsomeres (Fig. 31).	3
2(1)	Mesosoma almost entirely reddish orange (Fig. 8) [Costa Rica]	<i>clava</i>
–	Mesosoma predominantly black, except for lateral portion of pronotum, lateral lobes of mesoscutum and axillae (Fig. 9) [Central & Northern South America] . . .	<i>cultriformis</i>
3(1)	Metatibia completely yellow.	4
–	Metatibia black, at least in part.	6
4(3)	Metafemur entirely yellow (Fig. 17); tarsal claws robust; female with last flagellomere of antenna white, hypopygium nearly reaching apex of metasoma (Fig. 32); male antenna with flagellar setae subequal to width of flagellomere (Fig. 46) [Costa Rica to Ecuador]	<i>ruficollis</i>
–	Metafemur with dark spot, tarsal claws gracile; female with flagellum entirely dark; hypopygium reaching no more than ¾ length of metasoma (Fig. 41); male antenna with flagellar setae 2–3× width of flagellomere (male unknown in <i>B. citri</i>) (Fig. 51).	5

- 5(6) Larger (> 4 mm); sides of gaster with extensive yellow markings, metacoxa entirely yellow (Fig. 4) [Costa Rica, Mexico] *camacho*
- Smaller (3–4 mm); sides of gaster mostly black; metacoxa sometimes extensively black (Fig. 7) [Costa Rica] *citri*
- 6(3) Scutellum mostly yellow or orange yellow (sometimes with a thin, longitudinal, black line in middle). 7
- Scutellum entirely black. 10
- 7(6) Mesopleuron and propodeum black. 8
- Mesopleuron and propodeum orange (often black in median cavity). 9
- 8(7) Center of pronotum with wide black spot; dorsal-posterior part of head entirely black; mesoscutum and scutellum orange (reddish) yellow (Fig. 19) [Costa Rica] ... *ticos*
- Center of pronotum with very narrow, longitudinal black line; dorsal-posterior part of head with yellow area between occiput and ocellar area; mesoscutum and scutellum pale yellow (Fig. 2) [Brazil, Costa Rica] *bahiae*
- 9(7) Top of head, dorsal surface of pronotum, and center of propodeum predominantly black; mesothorax reddish orange (Fig. 10) [Costa Rica] *flava*
- Nearly entire body yellow (Fig. 3) [Ecuador] *bouceki*
- 10(6) Lower face black, at least laterally, (Fig. 52) [small species, 4 mm or less in length; males unknown.] 11
- Lower face completely yellow (Fig. 53). 12
- 11(10) Central area of lower face yellow (Fig. 52); entire mesosoma including coxae (at least basally) black; fore wing slightly infuscate below marginal and stigmal veins (Fig. 1); female petiole wider than long [Ecuador] *atra*
- Entire head black; pronotum, pro- and mesocoxae yellow; fore wing not infuscate; female petiole at least $3\times$ as long as broad (Fig. 13) [Ecuador] *nigracephala*
- 12(10) Fore wing with dark spot beneath stigmal vein (Fig. 15) [Costa Rica] *nublada*
- Fore wing without dark spot. 13
- 13(12) Gaster extremely narrow and elongate, in female length $6\times$ maximum height (Fig. 11), in male at least $3\times$ height; fore wing veins very thin (Fig. 54); mesoscutum and scutellum of male with transverse wrinkles, pronotum slightly concave dorsally. [Dorsal surface of mesosoma completely black] [Colombia, Ecuador, Peru, Venezuela] *leptogaster*
- Gaster less elongate (length no more than $5\times$ maximum height in female); veins thicker; male dorsum lacking above characteristics. 14
- 14(13) Gaster with continuous, longitudinal, pale stripe on lateral surface (not interrupted by vertical dark markings), more evident in female (Fig. 18) [Hypopygium nearly reaching tip of gaster, male scape without protruding apical knob, petiole predominantly smooth, dorsal surface of mesosoma entirely black, or nearly so] [Central, South America] *stichogaster*
- Gaster without continuous pale stripe on lateral surface. 15
- 15(14) Metacoxa almost entirely black (Fig. 5) [Small, about 4 mm in length; mesosoma, except sides of pronotum, all black; male scape with apical knob opposite insertion of pedicel] [Brazil, Ecuador] *chica*
- Metacoxa completely yellow. 16
- 16(15) Female with petiole elongate, $4\times$ as long as wide (Fig. 55) [Size and color similar to *B. noyesi*; male unknown] [Ecuador] *petiolata*
- Female with petiole at most as long as wide, usually wider than long. 17
- 17(16) Female petiole nearly as long as wide; male scape without apical knob, petiole slightly shorter than metacoxa and dorsally reticulate. [Small, about 4 mm in length; mesoscutum black, pronotum mostly yellow] [Colombia, Ecuador, Peru] ... *noyesi*
- Female petiole much wider than long; male scape with apical knob, or if without knob (*B. christeri*), then petiole slightly longer than metacoxa and dorsally shiny. 18

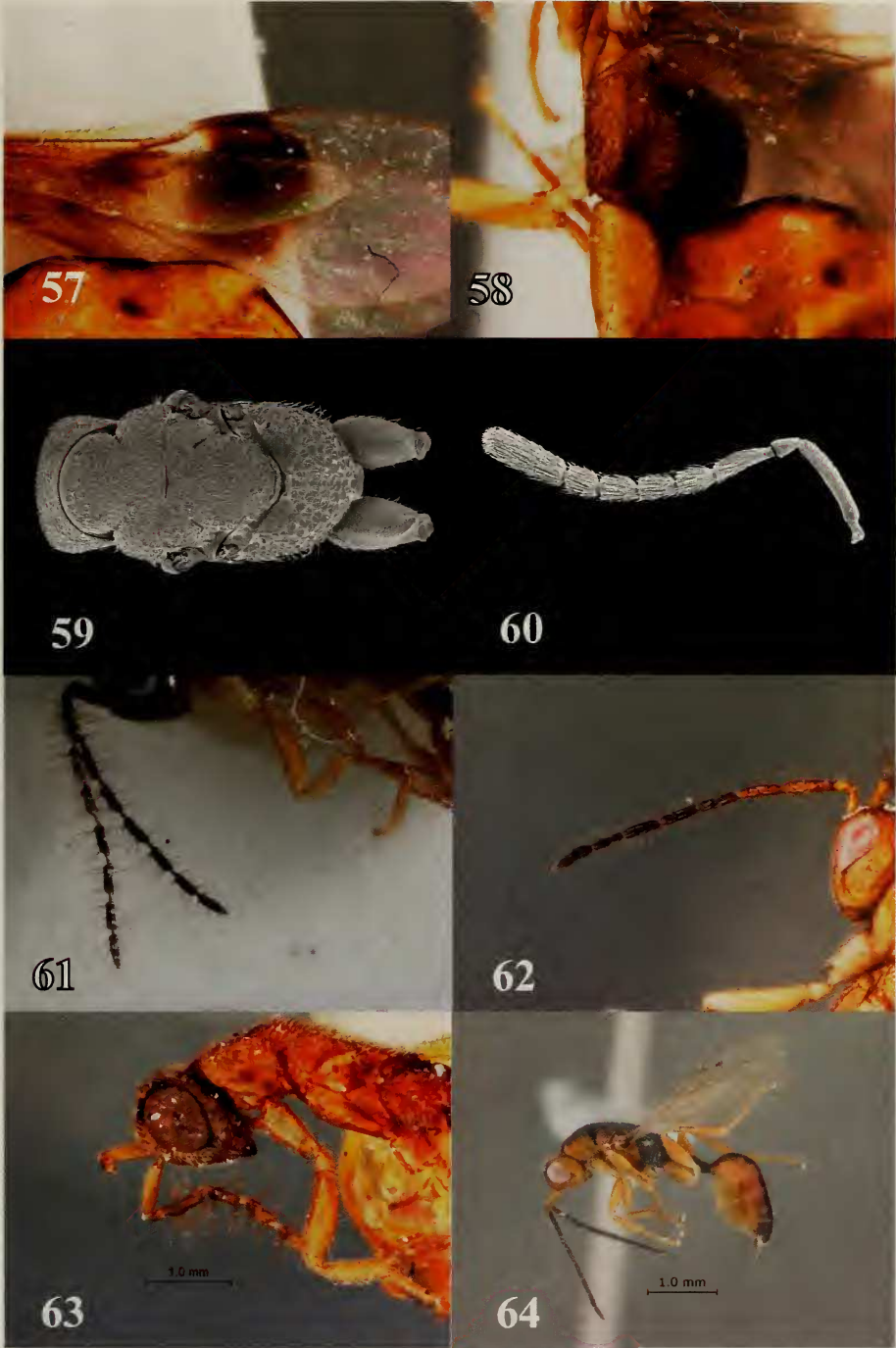
- 18(17) Female with pronotum usually entirely yellow (Fig. 6) (sometimes with some black posteriorly); mesoscutal lobes orange, antenna usually with pale funiculum and darker colored clava; male scape without pronounced apical knob. [Brazil, Colombia, Ecuador, Peru] *christeri*
- Female pronotum with extensive black, mesoscutal lobes orange or black; antennal flagellum uniformly colored; male scape with prominent apical knob opposite insertion of pedicel (Fig. 56) [Colombia, Costa Rica, Ecuador, Peru, Venezuela] *lorraineae*

KEY TO SPECIES OF *ISOSOMODES*

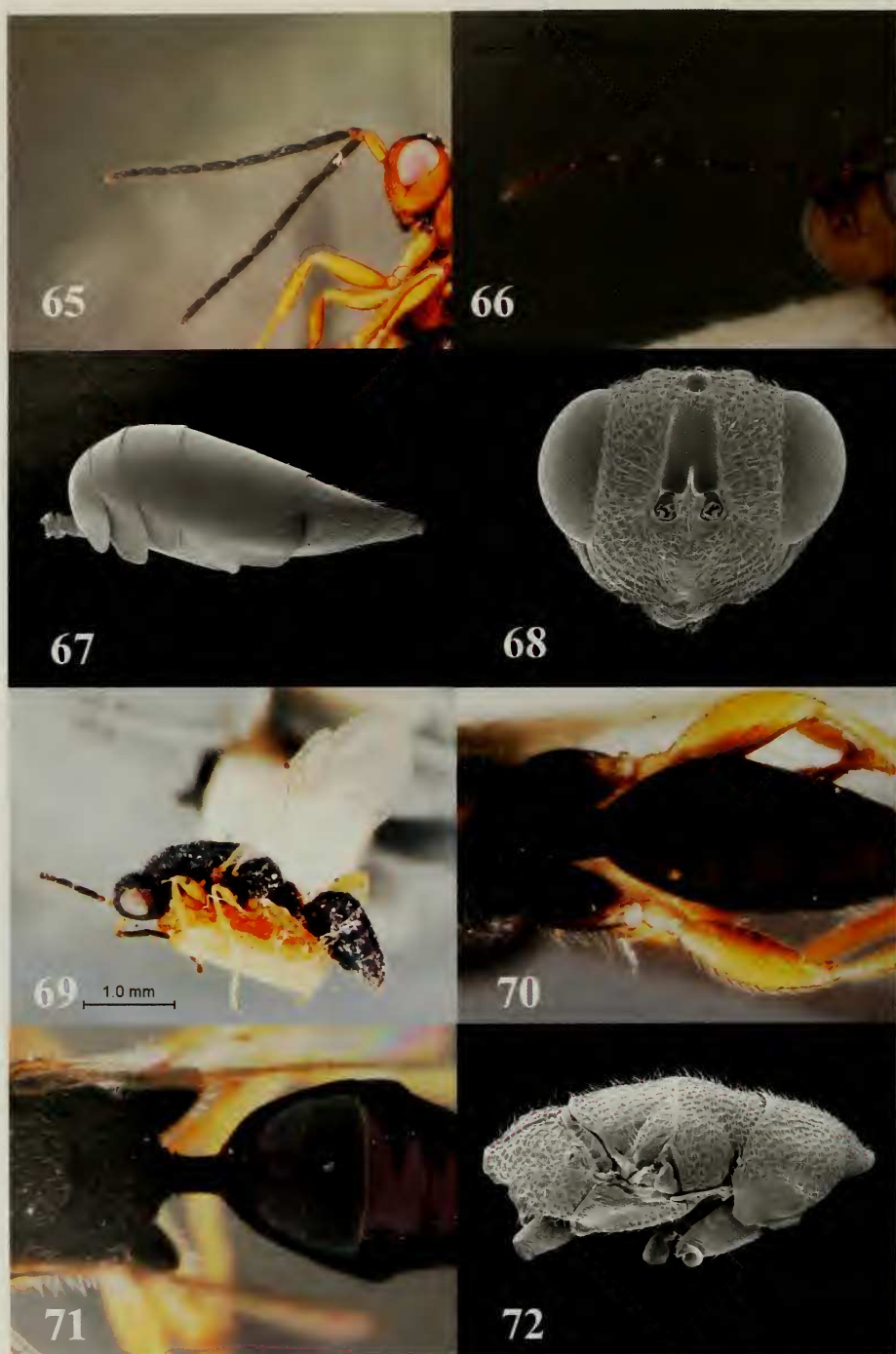
- 1 Mesosoma with considerable orange coloration; male flagellomeres cylindrical or asymmetrical, their setae $\geq 1.2\times$ longer than width of flagellomere 2
- Body all dark brown to black (except for small yellow spot on anterior lateral corner of pronotum); male flagellomeres cylindrical, their setae $\leq 1.1\times$ longer than width of flagellomere 7
- 2(1) Scutellum orange 3
- Scutellum black, at least posteriorly 6
- 3(2) Fore wing with infusate spot (Fig. 57); propodeum with median channel deep, distinct, and reticulate (Fig. 58) [Ecuador] *I. paradoxus*
- Fore wing hyaline; propodeum with median channel shallow, less distinct, and foveate (Fig. 59) 4
- 4(3) Male flagellomeres symmetrical, either spindle-shaped or parallel-sided; female vertex and propodeum completely black 5
- Male flagellomeres asymmetrical (Fig. 63); female unknown [Brazil] *I. nigriceps*
- 5(4) Apex of female clava angled, with dense micropilosity (Fig. 60); head mostly black (Fig. 20); male antenna with flagellomeres asymmetrical, with long setae $2-3\times$ as long as maximum diameter of flagellomere (Fig. 61) [Costa Rica]. *I. azofiefai*
- Apex of female clava tapered, with sparser ring of micropilosity; head orange (Fig. 23); male antenna with flagellomeres parallel-sided, with long setae at most $2\times$ as long as maximum diameter of flagellomere (Fig. 62) [USA: MD, NC]. *I. landoni*
- 6(2) Apex of female clava tapered, with moderate micropilosity; mesoscutum and scutellum mostly black (Fig. 26); male antenna with flagellomeres parallel-sided, with long setae about as long as maximum diameter of flagellomere (Fig. 64) [USA: MD]. *I. parkeri*
- Apex of female clava conical with dense micropilosity (Fig. 65); mesoscutum orange and scutellum black, at least posteriorly (Fig. 22); male antenna with flagellomeres spindle-shaped, with long setae $2-3\times$ as long as maximum diameter of flagellomere (Fig. 66) [Colombia] *I. colombia*
- 7(1) Female petiole $<1.0\times$ as long as broad (Fig. 67); antenna with at least F6+clava brown, sometimes F2-F5 also brown; pro- and mesocoxae yellow or brown (Fig. 68); male flagellomeres brown (Fig. 69); petiole rugulose/foveolate dorsally, rarely with fine longitudinal carinae anteriorly, paired submedian carinae absent posteroventrally (Fig. 70) [USA, Central and South America]. *I. gigantea*
- Female petiole $>1.0\times$ as long as broad (Fig. 71); antenna with at least clava brown, F2-F5 yellow; pro- and mesocoxae yellow (Fig. 72); male flagellomeres yellow, except clava and F6 (often F5) brown (Fig. 73); petiole foveolate dorsally, with fine longitudinal carinae anteriorly, paired submedian carinae present posteroventrally (Fig. 74) [Costa Rica]. *I. similis*



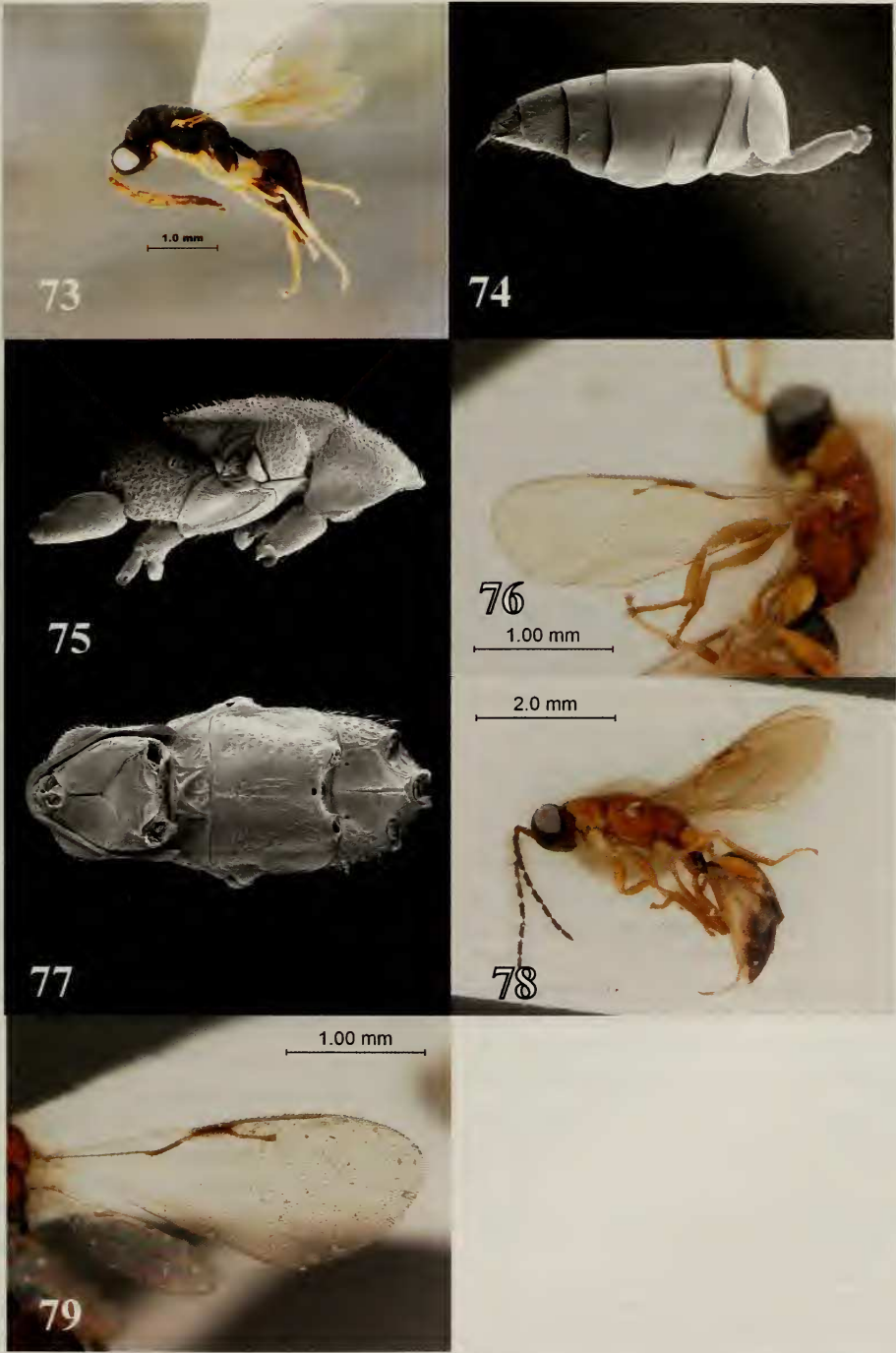
Figs 49–56. 49, *Bephrata cultriformis*, metatibial spur; 50, Pseudophyllinae eggs in *Citrus* stem (Tettigoniidae); 51, *B. camacho*, male antenna; 52, *B. atra*, face; 53, *B. nublada*, face; 54, *B. leptogaster*, fore wing; 55, *B. petiolata*, petiole; 56, *B. lorraineae*, male scape.



Figs 57–64. 57, *Isosmodes paradoxus*, fore wing; 58, *I. paradoxus*, propodeum; 59, *I. gigantea*, dorsal mesosoma; 60, *I. azofiefai*, female antenna; 61, *I. azofiefai*, male antenna; 62, *I. landoni*, male antenna; 63, *I. nigriceps*, male antenna; 64, *I. parkeri*, male habitus.



Figs 65–72. 65, *Isosomodes parkeri*, male antenna; 66, *I. colombia*, male antenna; 67, *I. gigantea*, female petiole; 68, *I. gigantea*, female habitus; 69, *I. gigantea*, male habitus, lectotype; 70, *I. gigantea*, male petiole; 71, *I. similis*, dorsal female petiole; 72, *I. similis*, female mesosoma.



Figs 73–79. 73, *Isosmodes similis*, male habitus; 74, *I. similis*, male dorsal petiole; 75, *I. azofiefai*, lateral mesosoma; 76, *I. azofiefai*, female fore wing; 77, *I. azofiefai*, ventral mesosoma; 78, *I. azofiefai*, male habitus; 79, *I. colombia*, female fore wing.

Bephrata atra Gates and Hanson, n. sp.
(Figs 1, 52)

Female holotype.—Body length 3.5 mm. *Color*: Body black except yellow on lower scape (rest of antenna dark brown), central lower face (triangular area from toruli to lower margin of clypeus) (Fig. 52), fore and middle legs (coxae black), metatarsus; postorbital margin orange yellow; gaster partially yellowish brown laterally and ventrally (Fig. 1). *Head*: 1.4× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present, extending 0.5× eye height; malar space 0.47× eye height; ratio of lateral ocellus: ocellocular distance: postocellar distance as 15:13:35; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 21:10:1:18:14:14: 14:14:12:15. *Mesosoma*: 2.0× as long as broad, pronotum 0.7× as long as broad, mid lobe of mesoscutum about as long as broad, scutellum slightly longer than broad; notauli composed of row of foveae, axillular grooves obliterated; femoral depression substrigulate; metapleuron deeply foveate; propodeum deeply foveate to alveolate (with numerous carinae forming irregular setose cavities), with a broad, weakly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a straight carina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 62:22:12:7:4:7; ratio marginal vein: postmarginal vein: stigmal vein as 22:36:20, slightly infumate below marginal vein. *Mesosoma*: Petiole 0.35× as long as broad, gaster about 2.8× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 15:15:9:16:14:14:8:4; hypopygium reaching 0.75× length of gaster, apical region of ventral line with 6 pairs of setae.

Male.—Unknown.

Diagnosis.—Other small black species include *B. chica*, *B. citri*, and *B. nigracephala*.

However, *B. atra* is the only *Bephrata* having a black head with a yellow triangle on the lower face.

Variation.—Female length ranges 3.2–4.0 mm in length. The scape varies from yellow to dark brown, the pro- and mesocoxae vary from black to yellowish brown, and the degree of infumation on the fore wing is somewhat variable.

Type specimens.—Holotype, ♀ (USNM): ECUADOR, Napo, Reserva Etnica Waorani, Transect Ent. 1 km S. Okone Gare Camp, 00°39'10"S, 76°26'0"W, 220 m, 10.x.1994, T. Erwin et al., Canopy fogging, Lot # 942.

Paratypes, 3♀ (USNM): ECUADOR, same data as for holotype except 7.x.1995, Lot # 1233; Napo, Tiputini Biodiversity Station, 216 m, 00°37'55"S, 76°08'39"W, 7.ii.1999, T. Erwin et al., fogging of mostly bare green leaves, some with covering of lichenous or bryophytic plants, Lot # 2054, Transect 6 (2♀). PERU, Loreto, Cmp. S. Branch, 75.20W, 05.12E, Igagpo Forest, 12.v.1990, T. Erwin fogging to 20 m nr. river, Lethacidaceae + vine (♀).

Etymology.—From the Latin for black, referring to the predominantly black coloration of this species.

Biology.—Unknown.

Distribution.—Upper Amazon basin in Ecuador and Peru.

Bephrata bahiae (Ashmead)
(Fig. 2)

Aximogastra bahiae Ashmead 1904: 261. Holotype ♀, by monotypy. Bahia, Brazil (USNM). *Bephrata bahiae*: Lotfalizadeh et al. 2007: 509.

Female holotype.—Body length 6.8 mm. *Color*: Yellow except following areas dark brown: transverse band on vertex between posterior ocelli, pronotum posteromedially, mesoscutum anteriorly, scutellum medially (line) and along posterior edge, dorsellum, propodeum, mesopleuron except along anterior edge femoral depression and dorsally, metapleuron except ovate area medially, petiole, Gt1, Gt2–3 with dorsal line and maculae at ventroposterior

corners, Gt4 with dorsal line expanded apically along tergal margin (T-shaped), Gt5–6 dorsally; syntergum, ovipositor sheaths. Head: $1.3\times$ as broad as high; clypeus with apical margin emarginate; anterior tentorial pits indistinct; genal carina present, extending $1/3$ eye height; malar space $0.45\times$ eye height; ratio lateral ocellus:ocellular distance:postocellar distance as 12:12:28; scape reaching just to anterior ocellus; ratio scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: club as 38:15:3:30:20:[30:20:15:14:31: F3-club missing in LT]. Mesosoma: $2.33\times$ as long as broad, pronotum $0.50\times$ as long as broad, mid lobe of mesoscutum $1.50\times$ as long as broad, scutellum $1.40\times$ as long as broad; notauli and axillular grooves evident as row of foveae; femoral depression strongly substrigulate; metapleuron foveate; propodeum with numerous carinae forming irregular setose cavities, median channel broad, rugulose with a few cross carinae forming asetose cells; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina; [apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 130:25:25:14:8:20; missing in LT]; ratio marginal vein:postmarginal vein:stigmatal vein as 40:70:32. Metasoma: Petiole $2.0\times$ broader than long, produced anterolaterally into small prongs; gaster nearly $4\times$ as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 60:70:50:65:103:50:85:28; hypopygium nearly reaching $0.85\times$ length of gaster, apical region of ventral line with 12 pairs of setae.

Male.—Body length 4.5 mm. Color: as described for female. Scape with concolorous oval area opposite insertion of pedicel, protruding as a knob; flagellomeres elongate and of uniform width, each with three whorls of erect setae, each 3– $4\times$ as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1–F6: clava as 35:10:2:40:36:33:31:30:25:30. Gastral petiole $3.4\times$ as long as broad, just longer than metacoxa, nearly parallel-sided

but broadest medially, dorsally nitid; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 55:20:22:29:24: 13:11:7.

Diagnosis.—Center of pronotum with very narrow, longitudinal black line; dorsal-posterior part of head with yellow area between occiput and ocellar area; mesoscutum and scutellum pale yellow. *Bephrata bahiae* may be confused with *B. ticos*, but the latter species has the center of pronotum with wide black spot, the dorsal-posterior part of head entirely black, and the mesoscutum and scutellum orange (reddish) yellow.

Variation.—Females vary in the extensiveness of the dorsal maculation and wing infuscation. One specimen from Cabo Blanco has a darker brown flagellum than the second from that locality.

Type specimens.—Holotype, ♀ (USNM): 789, Bahia, Brazil, Type No. 7342.

Other specimens examined.—COLOMBIA, Bolivar SFF, Los Colorados, La Suiris, $9^{\circ}54'00''\text{N}$ $75^{\circ}07'00''\text{W}$, 126 m, 15–30.ix.2000, E. Deuluteut (1♂, USNM). COSTA RICA, Limon, Parque Nacional Tortuguero, Estación Cuatro Esquinas, 0 m, iv.1993, R. Delgado, LN 280000 590500 (1♀, MZCR); Puntarenas, Estación Cabo Blanco, 100 m, 18.vii–9.x.1991, Malaise, LN 175150 416300, #1873, COSTA RICA INBio CRI00061926478 (1♀, INBio); Reserva Natural Cabo Blanco, Estación San Miguel, ix.1993, M. Ramírez, LS 173174_411412, #2343, COSTA RICA INBio CRI00061651456 (1♀, INBio).

Biology.—Unknown.

Distribution.—Known from Brazil, Colombia, and Costa Rica.

Bephrata bouceki Gates and Hanson, n. sp.
(Fig. 3)

Female holotype.—Body length 7.6 mm. Color: Yellow except following areas dark brown: F6, clava, medial margin posterior ocellus, posterior margin anterior ocellus, petiole, longitudinal median strip on anterior $1/2$ Gt1, dorsoapical macula medially on Gt2, dorsoapical macula (Δ -shaped) medially on Gt3, dorsoapical macula (Δ -

shaped) medially on Gt4 becoming transverse band laterally, Gt5 dorsally (faint); ovipositor sheaths. Fore wing weakly infusate near venation and in basal 1/3. Head: 1.4× as broad as high; clypeus with apical margin emarginate; anterior tentorial pits small; genal carina present, extending 1/3 eye height; ratio lateral ocellus:ocellocular distance:postocellar distance as 13:11:25; scape extending above anterior ocellus; ratio scape (minus radicle):pedicel: anellus: F1:F2:F3:F4:F5:F6: club as 50:17:3:41:32:31:30:28:23:34. Mesosoma: 2.0× as long as broad, pronotum 0.66× as long as broad, mid lobe of mesoscutum 1.56× as long as broad, scutellum about as long as broad; notauli weak but evident, axillular grooves evident; femoral depression strigulate; metapleuron foveate-alveolate; propodeum with numerous carinae forming irregular setose cavities, median channel broad, nitid, lacking transverse carinae; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina; apex of metatibia with a short, pointed spur; ratio metatibia: metatarsomeres as 170:55:28:15:10:25; ratio marginal vein:postmarginal vein:stigmatal vein as 55:90:48. Metasoma: Petiole 0.2× as long as broad, produced laterally as upturned spur; gaster nearly 3.5× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 45:110:70:90:100:55:40:10; hypopygium nearly reaching 0.90× length of gaster, apical region of ventral line with 10 pairs of setae.

Male.—Body length 5.7 mm. Color: as described for female, except dorsum of gaster black and petiole dark brown. Scape with pale oval area opposite insertion of pedicel, protruding as a knob; flagellomeres elongate and of uniform width, each with multiple whorls of erect setae, each 2–4× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1–F6: clava as 50:13:2:50:50:47:40:40:35:40. Gastral petiole 4.0× as long as broad, just longer than metacoxa, nearly parallel-sided but broadest medially, dor-

sally nitid, ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 75:20:22:29:24:13:11:7.

Diagnosis.—This is one of the only nearly uniformly yellow species, comparable to *B. flava*, but that species has the propodeum, vertex, and dorsal pronotum black.

Variation.—The four known females are very similar, length ranges 4–7.6 mm.

Type specimens.—Holotype, ♀ (USNM): ECUADOR, Sucumbios, Sacha Lodge, 0.5°S 76.5°W, 10–20.ix.1994, P. Hibbs, MT.

Paratypes, 3♀, 1♂: same data as holotype (1♀, USNM); Napo, 1 km S. Okonegare Camp, Reserva Etnica Waorani, 220 m, 22.vi.1998, 00° 39'10"S 76° 26'00"W, T. L. Erwin et al., fogging terre firme forest, transect Ent Lot 715 (1♀, EPNC). COLOMBIA, Amazonas, Productividad Primaria Neta Amacayacu Matatmata, Moca-gua, 300 m, 24.iv–5.v.2000, 3° 23'01"N 70° 06'01"W, A. Parente, M.88 (1♂, IAVH). PERU, Madre de Dios, Rio Tambopata Res., 30 km (air) SW Puerto Maldonado, 290 m, 10.ix.1984, 12° 50'S 69° 17'W, Smithsonian Institution Canopy Fogging Project, T. L. Erwin (1♀, USNM).

Etymology.—Named for Zdenek Bořček in honor of his massive contributions to the study of Chalcidoidea.

Biology.—Host unknown.

Distribution.—Colombia, Ecuador.

Bephrata camacho Gates and Hanson, n. sp.
(Figs 4, 41, 51)

Female holotype.—Body length 5.8 mm. Color: Head orange yellow, antennal flagellum dark brown, small black area in ocellar area and occiput; mesosoma black except yellow on lateral dorsal margin and lateral margin of pronotum; legs yellow except dark spot on basal 1/2 of metafemur; gaster with terga 1–2 and 6–7 dark brown, Gt3–Gt5 light yellow except dark brown dorsally (medially) and with much broader band on posterior margin. Head: 1.4× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present, extending 1/3 eye height; malar space 0.31× eye height; ratio of lateral ocellus: ocellocular distance:

postocellar distance as 11:4:17; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: clava as 30:5:2:22:19:19:17:15:14:16. Mesosoma: 2.3× as long as broad, pronotum 0.7× as long as broad, mid lobe of mesoscutum and scutellum approximately as long as broad; notauli and axillular grooves obliterated; femoral depression coriarius-substrigulate; metapleuron deeply foveate to alveolate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with shallow, narrow groove in center; basal anterior portion of procoxa with large oblique depression, bordered mesally by semicircular carina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 47:20:9:6:3:5; ratio marginal vein: postmarginal vein: stigmal vein as 24:35:14. Metasoma: Petiole 0.5× as long as broad, produced laterally as upturned spurs; gaster 3.4× as long as high; ratio of Gt1-Gt7, ovipositor sheath (all measured dorsally): 20:13:21:28:19:32:13:6; hypopygium reaching 0.6× length of gaster, apical region of ventral line with 10 pairs of setae.

Male.—Body length 3.8 to 5.4 mm. Color: as for female, except often with more black on top of head, pronotum, and dorsal (medial) part of terga. Scape with light colored oval area opposite insertion of pedicel, but this area not protruding as a knob; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 30:7:2:36:35:33:32: 28:24:28. Gastral petiole 3.5× as long as broad, same length as metacoxa, nearly parallel-sided but narrowing slightly at apex, dorsal surface coriarius; ratio of petiole: Gt1-Gt7 (dorsal length measured in lateral view) as 30:23:7:20:24:18:8:11.

Diagnosis.—This species and *B. ruficollis* are the only two *Bephrata* with a completely light-colored metatibia. However, *B. camacho* has lighter yellow markings as opposed

to orange yellow, has a dark spot on the metatibia, the female flagellum is uniformly colored, the hypopygium barely reaches beyond the midpoint of the gaster, and the flagellar setae of the male are much longer.

Variation.—Female length ranges 4.0–6.1 mm in length. Specimens vary in the amount of black markings on the top of the head and pronotum, from relatively little to extensive (as in males).

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Heredia, OTS-La Selva, 100 m, iii-iv.1993, P. Hanson, MT.

Paratypes, 61♀, 24♂: Same data as for holotype (1♀, USNM); iii.1991 (2♀, CNC); iv.1991 (3♀, CNC); ix.1992 (2♀, 1♂, CNC); v.1990, H. Hespenheide (1♀, 1♂, USNM); i.1994, ALAS (3♀, USNM); ii.1994 (1♀, USNM); ix.1994 (1♀, USNM); 30.iii.2002, M. Gates (1♂, USNM); Heredia, Chilamate, 75 m, vii-viii.1989, P. Hanson (1♂, USNM); Puntarenas, San Vito, Jardin Bot. Las Cruces, 1200 m, vi-vii.1988, P. Hanson (1♀, 2♂, MZCR); vii-viii.1988 (4♀, 1♂, USNM); Estación Biológica Las Alturas, 1500 m, i.1992, Hanson and Godoy (1♀, USNM); v.1992 (2♀, 2♂, USNM); vi.1992 (1♀, USNM); xi-xii.1992 (1♂, USNM); Puntarenas, Reserva Biológica Carara, Estación Quebrada Bonita, 50 m, v-vi.1989, P. Hanson (1♂, USNM); Golfo Dulce, 10 km W Piedras Blancas, 100 m, iii-v.1989, P. Hanson (1♀, 1♂, USNM); 24 km W Piedras Blancas, 200 m, ii-iii.1989 (2♀, MZCR); iii-iv.1989 (1♀, MZCR); vi-vii, 1989 (1♀, MZCR); iii-vi.1990 (1♀, MZCR); vii-ix.1990 (1♀, MZCR); iv-v. 1991 (2♀, MZCR); ii.1992 (2♀, MZCR); 3 km SW Rincon, 10 m, iii-v.1989 (2♀, MZCR); vi-viii.1989 (3♀, MZCR); iii.1993 (2♀, MZCR); Parque Nacional Corcovado, Estación Los Patos, Sendero Sirena, El Pavo, 70 m, 13.ii-18.iii.2001, J. Azofeifa (1♀, INBio); Guanacaste, Estación Pitilla, 9 km S Santa Cecilia, 700 m, v.1988, P. Hanson and I. Gauld (1♀, 1♂, BMNH); ix.1988 (5♀, 1♂, BMNH); i.1989 (1♀, BMNH); iv.1989 (2♀, 1♂, BMNH); v.1989 (2♂, BMNH); vi.1989 (4♀, BMNH); Guanacaste, Estación Maritza, W. Volcan Orosi, iv-v.1989 (1♀, 1♂, INBio); Guanacaste, Macizo Miravalles, Estación Cabro Muco, 1100 m, iii.2003, J. Azofeifa, B. Hernandez, J.D. Gutierrez (1♀, 2♂, INBio); Alajuela, San Carlos, La Fortuna, Parque Nacional Arenal, Sector Catarata, 500 m, 15.iii-24.iv.2001, G. Carballo (1♀, INBio). MEXICO, Veracruz, Estación Biológica De Los

Tuxtlas, 18°35'N 95°05'W, 28.iv.1991, H. A. Hespenheide (4♂, USNM); 7.v.1991 (1♀, USNM); Quintana Roo, Chichén Itzá Ruins, 17.xii.93, L. Masner (1♀, USNM); San Antonio port of entry, July 14 1956, ex *Chamaedorea* stem (1♀, USNM).

Etymology.—Named in honor of Eddy Camacho for his numerous roles in assuring the efficient operation of lab 170 (Entomology) in the Escuela de Biología, Universidad de Costa Rica.

Biology.—Host unknown. One specimen from Mexico intercepted at the port-of-entry in San Antonio was apparently reared from a palm stem ("ex *Chamaedorea* stem"). A specimen from Costa Rica (La Selva, 9.v.1990, H. Hespenheide) is labeled "Clusia TF". This is one of the most commonly collected species of *Bephrata* in Costa Rica; specimens have been obtained from Malaise traps, sweeping, yellow pan traps, and canopy fogging.

Distribution.—Costa Rica (sea level to 1200 m), Mexico (Veracruz, Quintana Roo).

Bephrata chica Gates and Hanson, n. sp.
(Fig. 5)

Female holotype.—Body length 3.7 mm. Color: Body black except yellow on lower face and gena, lateral surface of pronotum, fore and middle legs, metatarsus; antenna and metafemur yellowish brown; gaster partially yellowish brown laterally and ventrally. Head: 1.2× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present, extending 0.5× eye height; malar space 0.44× eye height; ratio of lateral ocellus: ocellular distance: postocellar distance as 13:15:36; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: clava as 20:9:2:16:14:13:13:13:10:16. Mesosoma: 2.0× as long as broad, pronotum 0.7× as long as broad, mid lobe of mesoscutum about as long as broad, scutellum slightly longer than broad; notauli present as a row of foveae and axillular grooves deep; femoral depression coriarius-substrigulate; meta-

pleuron deeply foveate; propodeum deeply foveate to alveolate (with numerous carinae forming irregular setose cavities), with a broad, weakly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a heavily sclerotized sinuous carina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 57:21:11:9:4:10; ratio marginal vein: postmarginal vein: stigmal vein as 22:35:21. Metasoma: Petiole 0.35× as long as broad, gaster about 3× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 20:13:8:16:15:8:11:3; hypopygium reaching 0.8× length of gaster, apical region of ventral line with 6 pairs of setae.

Male.—Body length 2.8–4.0 mm. Color as for female, except often with more black on top of head, pronotum, and dorsal (medial) part of terga. Scape with whitish protruding knob opposite insertion of pedicel; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 21:4:2:20:22:22:20:17:12:16. Gastral petiole 4.0× as long as broad, 1.1× length of metacoxa, nearly parallel-sided, dorsal surface nitid; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 20:18:10:12:8:3:7:3.

Diagnosis.—Like *B. atra*, *B. citri*, and *B. nigracephala*, this is a small black species. However, *B. chica* can be distinguished by its black hind legs (except for the tarsi) and yellow lower face.

Variation.—Female length ranges 3.7–4.3 mm in length. On the head, the region between the ocelli and the occiput may be either solid black, or there may be two black areas separated by orange yellow.

Type specimens.—Holotype, ♀ (USNM): ECUADOR, Napo, Reserva Etnica Waorani, Transect Ent. 1 km S. Okone Gare Camp, 00°39'10"S 76°26'0", 220 m, 8.x.1995, T. Erwin et al., Canopy fogging, t10..5 #1265.

Paratypes, 2♀, 7♂ (USNM): same data as for holotype except 00°39'25.7"S 76°27'10.8"W, 216.3 m (1♂); Napo, Tiputini, Biodiversity Station, 216 m, 00°37'55"S 76°08'39"W, 22.x.1998, Lot # 1960 (1♂); 23.x.1998, Lot # 1900 (1♂); 5.ii.1999, Lot # 2090 (1♂). PERU, Madre de Dios, Rio Tambopata Res., 30 km (air) SW Puerto Maldonado, 290 m, 12°50'S 69°17'W, 12.xi.1983, T. Erwin (1♀); same data except 10.ix.1994 (1♂); Peru, Miami port of entry, 7.v.1964, with orchid, J. C. Buff (1♂). BRAZIL, Amazonas, 18.1 km E Campinas field station, km 60, N Manaus, 22.ii.1979, 02°30'S 60°15'W, canopy fogging sample #22, Montgomery et al. (1♀); Brazil, 29.x.1940, on bromeliads, Lot No. 40-22688 (1♂).

Etymology.—From the Spanish for small, referring to the diminutive size of this species.

Biology.—Unknown. One specimen was collected in association with an orchid and another with bromeliads.

Distribution.—Amazon basin of Brazil, Ecuador, and Peru.

Bephrata christeri Gates and Hanson, n. sp.
(Fig. 6)

Female holotype.—Body length 4.4 mm. **Color:** Head yellow except black on last two flagellomeres and small area around ocelli; mesosoma black except yellow pronotum and legs (metatibia dark brown), mesoscutal lobes orange (reddish) yellow; petiole black, gaster yellow except terga 1 and 7 dark brown, Gt3–Gt6 dark brown medially at dorsoposterior margin, especially Gt4 where dark band extends very far laterally (ventrally). **Head:** 1.4× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present, extending 1/3 eye height; malar space 0.29× eye height; ratio of lateral ocellus: ocellocular distance: post-ocellar distance as 21:11:36; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: clava as 30:10:2:27:23:23:22:21:17:25. **Mesosoma:** 2.1× as long as broad, pronotum 0.7× as long as broad, mid lobe of mesoscutum and

scutellum about as long as broad; notauli and axillular grooves as rows of shallow foveae; femoral depression substrigulate; metapleuron deeply foveate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with a broad, weakly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina somewhat laminate distally; apex of metatibia with a short, pointed spur; ratio metatibia: metatarsomeres as 46:18:9:6:4:6; ratio marginal vein: postmarginal vein: stigmal vein as 35:59:29. **Metasoma:** Petiole very transverse, gaster 2.2× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:25:15:30:23:4:9:4; hypopygium reaching 0.9× length of gaster, apical region of ventral line with 6 pairs of setae.

Male.—Body length 3.8–4.1 mm. **Color:** as for female, except antenna dark brown, entire ocellar area and dorsal surface of pronotum black, and gaster with more dark markings. Scape with whitish oval area opposite insertion of pedicel, but hardly protruding; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 15:3:1:14:14:15:14:14:11:13. Gastral petiole 3.9× as long as broad, 1.1× length of metacoxa, nearly parallel-sided, dorsal surface nitid; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 24:20:19:15:16:17:11:3.

Diagnosis.—This species is quite similar to *B. lorraineae*, but the latter species usually has more extensive black coloration on the pronotum and the female antennal flagellum is uniformly colored (as opposed to bicolored in *B. christeri*). The male scape of *B. lorraineae* has a prominent knob near the apex, which is much less well developed in *B. christeri*.

Variation.—Female length ranges 4.4–7 mm in length. The amount of black in

the ocellar region varies but never extends back to the occiput. Also somewhat variable is the degree to which the last two flagellomeres are darker than the preceding ones.

Type specimens.—Holotype, ♀ (USNM): ECUADOR, Napo, Reserva Etnica Waorani, Transect Ent. 1 km S. Okone Gare Camp, 00°39'10"S 76°26'0", 220 m, 10.ii.1995, T. Erwin et al., Canopy fogging, Lot #1009, t8...10 tierra firme forest.

Paratypes, 12♀, 6♂ (USNM): same data as holotype (2♀), same data except 10.x.1994, Lot 941 (1♀); 9.x.1995, Lot 1193 (1♀); 7.ii.1996, Lot 1443 (1♂); 216.3 m, 00°39'25.7"S 76°27'10.8"W, 6.x.1995, #1225 (1♀); 7.x.1995, #1240 (2♀); 12.ii.1995, #1033 (1♂); Tiputini Biodiversity Station, 216 m, 00°37'55"S 76°08'39"W, 5.ii.1999, Lot 2086, Trans 9 (1♂); 1.vii.1999, Lot 1852, Trans 6 (1♀). COLOMBIA, Amazonas, Productividad Primaria Neta Amacayacu, Matamata, San Martin, 150 m, 3°23'01"N 76°06'01"W, 30.vii–8.viii.2000, B. Amado, M.836 (1♀); 17–30.vii.2000, M.701 (1♂); 6–12.vi.2000, M.696 (1♂); 16–24.ix.2000, M.840 (1♂); Caqueta, Parque Nacional Natural Chiribiquete, Rio Sararamana, 0°9'44"N 72°37'01"W, 9–13.iv.2000, J. Cantillo, #484 (1♀); PERU, Madre de Dios, Rio Tambopato Res., 30 km (air), SW Puerto Maldohnado, 290 m, 12°50'S 69°17'W, 10.ix.1984, T. Erwin (1♀). BRAZIL, Amazonas, Hwy. ZF 2, km 19, ca 60 km N Manaus, 02°30'S 60°15'W, 17.viii.1979, Terra firme, canopy fogging TRS#09, tray# 632, Adis et al. (1♀).

Etymology.—Named in honor of Christer Hansson, for his contributions to our knowledge of Neotropical Chalcidoidea.

Biology.—Unknown.

Distribution.—Amazon basin of Brazil, Colombia, Ecuador, and Peru.

Bephrata citri Gates and Hanson, n. sp.
(Figs 7, 40)

Female holotype.—Body length 4.2 mm. Color: Black except following areas yellow: scape, apical 1/3 pedicel, anellus, face, gena, lateral panel pronotum, tegula, fore and middle legs, apical 1/3 metacoxa, metatrochanter, apical fifth metafemur, metatibia, and metatarsus. Head: 1.3× as broad as high; clypeus with apical margin

shallowly notched medially; anterior tentorial pits evident; striae radiating from clypeus very weak; genal carina present, extending to 0.5× eye height; malar space 0.4× eye height; ratio lateral ocellus:ocellular distance:postocellar distance as 5:7:23; scape reaching just to anterior ocellus; ratio scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: club as 25:8:2:18:17:16: 14:13:10:30. Mesosoma: 2.1× as long as broad, pronotum 0.6× as long as broad, mid lobe of mesoscutum 1.3× as long as broad, scutellum 1.3× as long broad; notauli as row of foveae and axillular grooves obliterated; femoral depression coriarius; metapleuron foveate; propodeum with numerous carinae forming irregular setose cavities, median channel narrow, with transverse carinae; basal anterior surface of procoxa with large oblique depression, bordered mesally by a short convex carina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 78:33:7:8:6:10; ratio marginal vein:postmarginal vein:stigmatal vein as 35:60:31. Metasoma: Petiole with dorsal length 0.7× as long as broad, produced anterolaterally into dull prongs; gaster about 3× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 35:26:18:29:40:41:20:4; [hypopygium nearly reaching 0.5× length of gaster, apical region of ventral line with 3 pairs of setae].

Male.—Unknown.

Diagnosis.—Like *B. atra* and *B. nigracephala*, this is a small black species. However, *B. citri* can be distinguished by its yellow metatibiae.

Variation.—Female length ranges 4.2–4.3 mm. In the paratype, the gaster is slightly more yellow ventrally.

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Puntarenas, San Vito de Coto Brus, V.1990, Luis More, huevos en tallo de citrico.

Paratypes, 3♀: same data as holotype (2♀, BMNH, USNM); Alajuela, Chiles de Aguas Zarcas, cafe, 300 m, i.1990, R. Cespedes (1♀, MZCR).

Etymology.—This species is named for the genus of plant with which the holotype is associated.

Biology.—Reared from eggs of pseudophylline katydids (Orthoptera: Tettigoniidae) embedded in citrus stems.

Distribution.—Costa Rica.

Bephrata clava Gates and Hanson, n. sp.
(Fig. 8)

Female holotype.—Body length 7.2 mm. *Color*: Orangish yellow except black mandibular teeth, ocellar area, metatibia, central concavity of propodeum, and gastral petiole; antennal pedicel and flagellum dark brown; gaster with terga 1 and 7 dark brown, Gt2–Gt6 with broad dark brown bands posterior dorsally. *Head*: 1.3× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina absent; malar space 0.34× eye height; ratio of lateral ocellus: ocellocular distance: postocellar distance as 13:9:20; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 38:12:3:27:25:25:22:21:18:27. *Mesosoma*: 1.8× as long as broad, pronotum 0.6× as long as broad, mid lobe of mesoscutum 1.1× as long as broad, scutellum approximately as long as broad; notauli evident as dark lines beneath surface sculpture, axillular grooves evident as row of foveae; femoral depression coriarius, adscrobal carina obliterated; metapleuron alveolate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with deep, broad, weakly sculptured median channel; basal anterior portion of procoxa without large oblique depression; apex of metatibia with a short, blunt spur; ratio metatibia: metatarsomeres as 62:41:20:11:4:9; ratio marginal vein: postmarginal vein: stigmal vein as 35:43:22. *Metasoma*: Petiole transverse and barely visible, gaster very elongate, about 4× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 22:56:42:38:45:18:18:6; hypopygium reaching almost to

tip of gaster, apical region of ventral line with 11 pairs of setae.

Male.—Body length 5.3–6.3 mm. *Color*: as for female. Scape with protruding knob at apex, opposite insertion of pedicel; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 32:7:2:38:36:35:33:30:30:32. Gastral petiole 4.4× as long as broad, 1.2× length of metacoxa, nearly parallel-sided, dorsal surface coriarius; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 35:27:30:38:25:15:15:12.

Diagnosis.—This species and *B. cultriformis* are the only species in the genus that lack the distinctive groove on the procoxae and could therefore be misidentified as a species of *Isosomodes*, but both can be distinguished from this genus by the characters listed in Table 1. *Bephrata clava* can be distinguished from *B. cultriformis* by its very different coloration, described above.

Variation.—Little variation was seen in the two females and two males examined.

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Heredia Pr, La Selva Biológica Sta., 3 km S Pto. Viejo, 10°26'N 84°01'W, 8.viii.1992, H. A. Hespenheide.

Paratypes, 1♀, 2♂: COSTA RICA, Guanacaste, Estación Maritza, W. Volcan Orosi, 600 m, vi.1988 (1♂, USNM); Estación Maritza, W. side Volcan Orosi, 600 m, 1989, GNP Biodiversity Survey, Malaise L_N_326900_373000 #6834 (1♀, MZCR); Limon, Parque Nacional Tortugero, Cuatro Esquinas, 0 m, xii.1992, R. Delgado (1♂, INBio).

Etymology.—From the Latin *clava* meaning club, referring to the stubby spur at the apex of the metatibia.

Biology.—Unknown.

Distribution.—Costa Rica, from sea level to 600 m.

Bephrata cultriformis (Ashmead)
(Figs 9, 47–49)

Bephrata cultriformis Ashmead 1894: 146. Holotype ♀, by monotypy. St. Vincent (USNM).

Aximogastra cultriformis: Gahan 1951: 173.

Bephrata cultriformis: Lotfalizadeh et al. 2007: 508.

Female lectotype.—Body length 6.3 mm. Color: yellow except following areas dark brown: antenna, metatibia except apices, Gt1, Gt2–5 with dorsal line that is expanded apically along tergal margin (Λ -shaped) and extending laterally, Gt6 dorsally; syntergum, ovipositor sheaths; or black: vertex transversely encompassing ocelli, just dorsad occipital foramen, pronotum posteromedially, mesoscutum anteriorly and with medial stripe, notauli, scutellum, dorsellum, propodeum, petiole. Head: $2.1\times$ as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina absent; malar space $0.3\times$ eye height; ratio lateral ocellus:ocellocular distance: postocellar distance as [12:12:28; rest of antenna covered in glue in holotype]; scape reaching to anterior ocellus; ratio scape (minus radicle): pedicel: anellus: F1:F2: F3:F4:F5:F6: club as 34:13:2:27:21:23:20: [15:14:31; missing in holotype]. Mesosoma: $2.3\times$ as long as broad, pronotum $0.7\times$ as long as broad, [mid lobe of mesoscutum $1.5\times$ as long as broad; glued in holotype], scutellum just longer than broad; notauli as rows of foveae, axillular grooves evident as impressed lines; femoral depression coriarius; metapleuron foveate; propodeum with numerous carinae forming irregular setose cavities, median channel broad, rugulose-reticulate with a few cross carinae along midline; procoxa rounded anterobasally, without a channel-like arcuate depression; apex of metatibia with a short spur blunt; ratio metatibia: metatarsomeres as 110:60:32:28:9:20; ratio marginal vein: postmarginal vein: stigmal vein as 60:80: 38. Metasoma: Petiole $0.5\times$ as long as broad, unproduced anterolaterally; gaster about $4.7\times$ as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 80:80:75:70:35:30:13:10; [hypopygium nearly reaching $0.85\times$ length of gaster, apical region of ventral line with 12 pairs of setae].

Male.—Body length 5.1 mm. Color: as in female, but dark coloration on gaster more extensive (see Variation); Scape with concolorous oval area opposite insertion of pedicel, protruding as a knob; flagellomeres elongate and of uniform width, evenly covered with multiple whorls of erect setae, each $2\text{--}3\times$ as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 38:10:2:40:40:40:35:30:28:35. Gastral petiole $5.0\times$ as long as broad, just longer than metacoxa, nearly parallel-sided but broadest medially, dorsally nitid; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 75:20:30:40:40:35:18:5.

Diagnosis.—This species and *B. clava* are the only species in the genus that lack the distinctive groove on the procoxae and could therefore be misidentified as *Isosomodes*, but both can be distinguished from this genus by the characters listed in Table 1. *Bephrata cultriformis* can be distinguished from *B. clava* by its very different coloration described above.

Variation.—Female length ranges 5–10 mm and males 4.0–6.3 mm. Both sexes vary considerably in extent of darker maculation on the body. The female from Venezuela has the lightest maculation, consisting of dark brown areas just surrounding the ocelli, a narrow stripe spanning the posteromedial pronotum and anteromedial mesoscutum, along the notauli in part and axillular grooves, mesopleuron, metapleuron, propodeum, metatibiae, metatarsomeres (light brown), petiole, and gaster (as in description). In the darkest female (Valle de la Estrella), not only is the maculation darker, but it is more extensive as follows: entire vertex and part of scrobal depression, subocular spot, occipital region, entire collum and medial $1/3$ pronotum, mesoscutum except strip along notauli, length of notauli, and the remainder as in Venezuela specimen but darker. The Ecuadorean females have maculation, in addition, as follows: supraclypeal spot, metacoxa in posterior $1/2$, metafemur

except apices. Males exhibit very similar color variation, though the least maculated specimens are not equal to that seen in the female from Venezuela.

Type specimen.—Holotype, ♀ (USNM): 2000 feet, St. Vincent, W. I., H. H. Smith, Paratype No. 2424 USNM. Described from a single specimen.

Other specimens examined.—COSTA RICA, Heredia, F. La Selva, 3 km S Puerto Viejo, 10° 26'N 84°01'W, 26.vi.1985, H. A. Hespenheide (1♀, USNM); Heredia, 3 km S Puerto Viejo, OTS-La Selva, 100 m, x.1992, P. Hanson (1♀, MZCR); OTS-La Selva, iii–iv.1993 (1♀, USNM); Limón, Valle de la Estrella, Reserva Biologica Hitoy Cerere, Sendero Toma de Agua, 100 m, 17.iv–8.v.1999, F. Umaña. Malaise L_N_184600_643400, #52757 (1♀, INBio). DOMINICA, Dleau Gommier, 1400', 2.iii.1965, H. E. Evans, Bredin-Archbold-Smithsonian Bio. Surv. Dominica (1♂, USNM). ECUADOR, Napo, 1 km S. Okonegare Camp, Reserva Etnica Waorani, Transect Ent, 220 m, 2.vii.1995, 00° 39'10"S 76° 26'00"W, T. L. Erwin et al., canopy fogging, Lot #1063, t7.3 terre firme forest, Restrictions Apply NMH-DCB/EPN Agreement 39 (1♂, EPNC); same data as previous but different dates/lots: 2.vii.1995, Lot #1090, t6..10 (1♂, EPNC); 9.vii.1995, Lot #1151 (2♂, EPNC); 5.x.1995, Lot #1194, t3.4 (2♂, EPNC); 6.x.1995, Lot #1223 (1♀, EPNC); 8.x.1995, Lot #1261 (1♀, EPNC); 8.x.1995, Lot #1265, t10.5 (1♂, EPNC); 7.ii.1996, Lot #1443, t5..3 (1♂, EPNC). MEXICO, Veracruz, Estación Biológica de Los Tuxtlas, 18°35'N 95°05'W, 28.iv.1991, H. A. Hespenheide (2♂, USNM); PERU, Madre de Dios, Rio Tambopata Res., 30 km (air) SW Puerto Maldonado, 290 m, 14.ix.1984, 12° 50'S 69° 17'W, T. Erwin et al. (1♀, USNM). VENEZUELA, San Esteban, xi.1939, Pablo Anduze (1♀, USNM).

Biology.—Host unknown. Two females from La Selva, Costa Rica, have mites on the gaster; one of them (collected 26.vi.1985) had nearly 40 individuals.

Distribution.—Costa Rica, Dominica, Ecuador, Mexico (Veracruz), Peru, and Venezuela.

Bephrata flava Gates and Hanson, n. sp.
(Fig. 10)

Female holotype.—Body length 5.9 mm. *Color*: Head yellow except black from vertex (beginning in upper 1/2 of antennal scrobe) to back of head and a small spot

below eye; antennal pedicel and flagellum dark brown; mesosoma orange yellow except black on dorsal pronotum, central cavity of propodeum, and metasternum, side of pronotum yellow; legs yellow except metatibia black; petiole black; gaster yellow except terga 1 and 7 dark brown, Gt3–Gt6 dark brown dorsally (medially) with posterior band extending ventrally (laterally) on Gt4 and Gt5, Gt3 with ventral band. *Head*: 1.3× as broad as high; clypeus with apical margin straight, curved slightly inward; anterior tentorial pits well developed; genal carina pronounced, extending to nearly 0.5× eye height; malar space 0.37× eye height; ratio of lateral ocellus: ocellular distance: postocellar distance as 20:16:42; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 30:9:2:24:21:20:20:19:18:28; funicular segments elongate. *Mesosoma*: 1.9× as long as broad, pronotum 0.4× as long as broad, mid lobe of mesoscutum 0.85× as long as broad, scutellum about as long as broad; notauli evident as impressed dark lines beneath surface sculpture, axillular grooves evident as rows of foveae; femoral depression nitid, substrigulate on anterior margin; mesepimeron nitid; metapleuron alveolate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with a broad, relatively deep, irregularly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina that is laminate distally; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 50:20:11:5:4:6; ratio marginal vein: postmarginal vein: stigmal vein as 19:32:15. *Metasoma*: Petiole very transverse, gaster 3.6× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:22:22:30:35:20:18:9; hypopygium reaching 0.75× length of gaster, apical region of ventral line with 11 pairs of setae.

Male.—Body length 4.7–5.2 mm. *Color*: as for female, except propodeum some-

times more extensively black and gaster with more dark markings. Scape with whitish oval area opposite insertion of pedicel that protrudes as a prominent knob; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 33:8:2:30:31:31:29:27:25:30. Gastral petiole 3.2× as long as broad, 0.95× length of metacoxa, parallel-sided, dorsal surface nitid; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 31:22:15:19:19:18:12:8.

Diagnosis.—Like *B. bouceki*, this species has a yellow mesopleuron and scutellum. However, *B. flava* has the top of the head and pronotum black, whereas in *B. bouceki* the body is nearly entirely yellow.

Variation.—Female length ranges 5.8–6.2 mm in length.

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Heredia, Puerto Viejo, La Selva, 100 m, i.1991, J. Noyes.

Paratypes, 7♀, 3♂: Limon, 4 km NE Bribri, 50 m, iv–vi.1990, P. Hanson (1♀, MZCR); 7 km SW Bribri, 50 m, ix.1989, P. Hanson (1♂, MZCR); Valle de la Estrella, Reserva Biológica Hitoy Cerere, Sendero Espavel, 240 m, i.2001, F. Umana (1♂, USNM); Sendero Toma de Agua, 100 m, 18.xi–18.xii.2000 (1♂, USNM); 11.x–11.xi.1999 (1♀, USNM); Guanacaste, Estación Pitilla, 9 km S Estación Cecilia, 700 m, 1991 (1♀, USNM); iv.1994, P. Rios (1♀, INBio); Alajuela, San Carlos, Parque Nacional Arenal, Sendero Pilon, 600 m, 9.ix–1.x.1999, G. Carballo (1♀, INBio); Puntarenas, San Luis, Monteverde, 1000–1350 m, viii.1993, Z. Fuentes (1♀, INBio); San Luis, Monteverde, Area de Conservación Arenal, 1000–1350 m, vi.1993, Z. Fuentes, Malaise, L N 449250_250850, # 2588 (1♀, INBio).

Etymology.—From the Latin for yellow, referring to the predominantly yellow coloration of this species.

Biology.—Unknown.

Distribution.—Costa Rican wet forests, sea level to 1000 m.

Bephrata leptogaster Gates and Hanson, **n. sp.**
(Figs 11, 44, 54)

Female holotype.—Body length 6.3 mm. Color: head yellow below (except for small black spot in middle of lower face), black above (beginning at toruli), antenna dark brown; mesosoma black except yellow on side of pronotum, fore and middle legs yellow except procoxa partially dark brown, metasomal legs dark brown; metasoma dark brown, yellowish brown ventrally. Head: 1.3× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present, fine, extending 1/3 eye height; malar space 0.27× eye height; ratio of lateral ocellus: ocellular distance: postocellar distance as 15:18:38; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 30:9:2:21:18:21:19:20:18:24. Mesosoma: 2.1× as long as broad, pronotum 0.7× as long as broad, mid lobe of mesoscutum 1.2× as long as broad, scutellum 1.3× as long as broad; notauli as row of foveae and axillular grooves distinctly impressed; femoral depression coriarius; metapleuron foveate; propodeum foveate with a very broad, reticulate median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a rounded lamina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 40:25:12:4:2:6; ratio marginal vein: postmarginal vein: stigmal vein as 21:24:13. Metasoma: Petiole very transverse, gaster 6.9× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:80:30:40:25:5:5:6; Gt1–Gt4 very emarginate medially; hypopygium almost reaching tip of gaster, apical region of ventral line with 10 pairs of setae.

Male.—Body length 5.2–6.2 mm. Color: as for female, but often with yellow between ocellar area and occiput. Scape without whitish oval area opposite insertion of pedicel; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as

width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 25:7:2:30:35:32:33:30:27:31. Dorsal surface of mesosoma with sculpture unlike that of the female, with strong transverse wrinkles; pronotum shallowly concave. Apex of metatibia with short spur blunt. Gastral petiole $4.2\times$ as long as broad, $1.2\times$ length of metacoxa, parallel-sided, dorsal surface nitid; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 26:26:38:30:30:10:13:8.

Diagnosis.—This species is quite unlike any other species. The gaster, especially in females, is extremely elongate, about $6\times$ as long as high. In coloration it is similar to *B. stichogaster*, which also can have a quite elongate gaster, but the wing veins of *B. leptogaster* are very thin, unlike any other *Bephrata*. The males are unlike any other species in having transverse wrinkles on the dorsal surface of the mesosoma, and the dorsal surface of the pronotum is somewhat concave.

Variation.—Female length ranges 6.0–6.4 mm in length. Maculation is somewhat variable in extensiveness, but typically not as variable as in species such as *B. cultriformra*.

Type specimens.—Holotype, ♀ (USNM): COLOMBIA, with *Cattleya*, v.3.'41, Hoboken 1377, Lot No 41-7524.

Paratypes, 10♀, 5♂, (USNM): same data as holotype (7♀); VENEZUELA, with wild *Cattleya*, 18.v.1945, Hoboken #4300 (1♀); wild *Cattleya*, Wash. D.C. (1♂); among orchid plants, 28.ii.1945, W.W. Chapman (1♂); on window in room with orchids, Hoboken #9360, McMast, 9.iv.1947 (1♂); #9680, Grayson, 13.vi.1947 (2♂); ECUADOR, Orellana, Reserva Etnica Waorani, Transect Ent. 1 km S. Okone Gare Camp, 216.3 m, 00°39'25.7"S 76°27'10.8"W, 4.x.1994, Erwin et al., #859 (1♀, EPNC); PERU, Loreto, Explorama Lodge, 80 km NE Iquitos on Amazon River, 24.vi–20.vii.1990, Menke and Awertschenko (1♀).

Etymology.—From the Greek *-leptos* for thin, and *gaster-* referring to the extremely thin gaster.

Biology.—Host unknown. Most specimens were collected in association with

orchids, especially *Cattleya* spp. The sculpture of the male is suggestive of parasitoids that emerge from wood.

Distribution.—Colombia, Ecuador, Peru, and Venezuela.

Bephrata lorraineae Gates and Hanson, n. sp.
(Figs 12, 43, 56)

Female holotype.—Body length 5.8 mm. *Color*: Head yellow except black spot in middle of scrobe, ocellar area, and occiput; antennal pedicel and flagellum dark brown; mesosoma black except pronotum yellow on lateral surface and lateral part of dorsal surface, mesosuctal lobe and lateral part of mid lobe (near notaulix) orange yellow; legs yellow except metatibia black; petiole black; gaster yellow except terga 1 and 7 dark brown, Gt2–Gt6 dark brown dorsally (medially) with posterior band extending ventrally (laterally) on Gt4 and Gt5, Gt3 with ventral band. *Head*: $1.3\times$ as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present, extending $0.5\times$ eye height; malar space $0.30\times$ eye height; ratio of lateral ocellus: ocellular distance: post-ocellar distance as 20:15:41; antenna with scape reaching middle of anterior ocellus ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 28:8:2:25:23:23:22:20:17:26. *Mesosoma*: $2.0\times$ as long as broad, pronotum $0.6\times$ as long as broad, mid lobe of mesoscutum and scutellum each about as long as broad; notauli evident as dark impressed lines beneath surface sculpture, axillular grooves obliterated; femoral depression substrigulate; metapleuron foveate; propodeum foveate-alveolate with a broad, weakly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina that is laminate distally; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 65:30:11:6:4:7; ratio marginal vein: post-marginal vein: stigmal vein as 13:27:8.

Metasoma: Petiole very transverse, gaster $3.6\times$ as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 23:21:20:25:36:14:26:5; hypopygium reaching $0.75\times$ length of gaster, apical region of ventral line with 8 pairs of setae.

Male.—Body length 4.6–5.2 mm. **Color:** as for female, except usually with more black on scape, ocellar area (joining with black area in scrobe but not with that in occiput), dorsal surface of pronotum and mesoscutum (lobes remaining at least partially orange yellow in most specimens), and gaster; first metatarsomere frequently darkened, sometimes black. Scape with whitish oval area opposite insertion of pedicel that protrudes as a prominent knob; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each $2\text{--}3\times$ as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 21:5:2:22:23:22:20:19:17:19. Gastral petiole $3.5\times$ as long as broad, same length as metacoxa, nearly parallel-sided, dorsal surface mostly nitid (weakly coriaceous in places); ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 35:31:20:22:18:11:14:15.

Diagnosis.—This species is most similar to *B. christeri* but has more black on the pronotum; at most, *B. christeri* has just a small black spot at the base of the dorsal surface; in addition the antennal flagellum of the female is uniformly colored whereas in *B. christeri* the last funicular segment and clava are usually darker than the preceding flagellomeres; the male scape of *B. lorrainae* has a protruding apical knob whereas that of *B. christeri* lacks a knob or has a much less protruding knob.

Variation.—Female length ranges 3.9–8.3 mm in length and are quite variable in **Color:** the mesoscutal lobes can be either black or orange, and the first metatarsomere is usually light colored but is dark in a few specimens. In many specimens of both sexes, including the holotype, the notauli are distinct (especially when sur-

rounded by orange yellow coloration), but are less distinct in other specimens.

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Puntarenas, R.F. Golfo Dulce, 24 km W Piedras Blancas, 200 m, iv–v.1992, P. Hanson.

Paratypes, 38♀, 7♂: Same data as for holotype (1♀, USNM); ii.1992 (3♀, MZCR); i–iii.1991 (1♀, CNC); iv–v.1991 (2♀, BMNH); vi–vii.1991 (1♀, CNC); xi.1991 (1♀, USNM); xi.1990 (1♂, USNM); 3 km SW Rincón, 10 m, vii.1991, Hanson and Godoy (1♀, MZCR); Peninsula de Osa, Rancho Quemado, 200 m, v.1992, F. Quesada and G. Varela, LS 292500 511000 (1♀, INBio); xii.1992, M. Segura (1♂, USNM); Golfito, Estación Agujas, 300 m, 15.ii–15.iii.2001, J. Azofeifa, LS 526550 276750 (1♀, INBio); 10–20.ii.2001 (1♂, INBio); Cerro Rincón, 645–745 m, 15.iv–15.v.2000, LS 275500 521950 (1♂, MZCR); Parque Nacional Corcovado, Sendero a Río Claro, 0 m, 1991, LS 508300 270500 (1♀, INBio); Limón, 4 km NE Bribri, 50 m, iv–vi.1990, P. Hanson (1♀, MZCR); Sector Cerro Cocori, Finca de E. Rojas, 150 m, vii.1991, E. Rojas, LN 286000 567500 (1♀, INBio); Guanacaste, Estación Pitilla, 9 km S de Sana Cecilia, 700 m, vii.1994, P. Ríos, LN 330200 380200 (1♂, INBio); Estación Murciélagos, 100 m, 28.ix–28.x.1993, E. Araya, LN 320300 347200 (1♀, INBio); Alajuela, Reserva Biológica Alberto Brenes (San Ramón), 900 m, v.2000, P. Hanson (1♀, MZCR). ECUADOR, Orellana, Tiputini, Biodiversity Station, 216 m, 00°37'55"S 76°08'39"W, 7.ii.1999, Lot 2058 Trans 1, T. Erwin et al., Canopy fogging (1♀, USNM); 23.x.1998, Lot 1904 Trans 1 (1♀, USNM); Lot 1901 (1♀, USNM); 9.ii.1999, Lot 2003 Trans 1 (1♀, USNM); nr Yasuni National Park, 220–250 m, T6/Sta.8, 1.vii.1998, Lot 1857 (1♀, USNM); Napo, Reserva Etnica Waorani, Trans Ent. 1 km S. Okone Gare Camp, 00°39'10"S 76°26'0", 220 m, 20.vi.1994, T. Erwin et al., Canopy fogging, Lot 688 (1♂, USNM); 6.x.1994, Lot 880 (1♀, USNM); 2.vii.1995, Lot 1063 (1♀, USNM); Lot 1090 (1♀, USNM); Lot 1093 (1♀, USNM); 9.x.1999, Lot 1257 (1♀, USNM); 5.x.2000, Lot 1755 (1♀, USNM); 00°39'25.7"S 76°27'10.8", 216.3 m, 4.x.1996, Lot 1753 (1♀, USNM); Chimborazo, Narnajapata, Chilicay, 16.vi.1955, R. LeviCastillo (1♀, USNM). PERU, Loreto, Camp. S. Branch, 75.20W 05.12E, Igapo Forest, 12.v.1990, T. Erwin, Fogging (1♀, 1♂, USNM); Explomapo, Camp. Rio Napo, Rio Sucusari, 100 m, 15.vi.1996, 03°15'S 072°55'W, Lot 382, T. Erwin (1♀, USNM); COLOMBIA,

Amazonas, Productividad Primaria Neta Amacayacu, San Martin, 150 m, 3°23'01"N 70°06'01"W, 22–30.v.2000, B. Amado #90 (1♀, USNM); Bolivar SFF, Los Colorados, La Suiris, 9°54'00"N 75°07'00"W, 126 m, 1–15.ix.2000, E. Deuluteut, 617 (1♀, USNM); VENEZUELA, Caracas, with *Cattleya* sp., San Francisco, #20585, 29.iii.1946 (1♀, USNM); UNKNOWN, window sill inspection room, Hoboken, N.J., 29.vii.1949, F. Perlmutter (1♀, USNM); Miami, Fla. Port, 29.iv.1969, U.C.Buff (1♀, USNM); Miami, Florida Inspection House, 15.vii.1969, F. Matthews (1♀, USNM).

Etymology.—Named in honor of Lorraine, the daughter of the second author.

Biology.—Host unknown. A specimen from Venezuela was associated with *Cattleya* orchids.

Distribution.—Costa Rica (0–900 m), Colombia, Ecuador, Peru, and Venezuela.

Bephrata nigracephala Gates and Hanson, n. sp.
(Fig. 13)

Female holotype.—Body length 3.9 mm. *Color*: black except yellow on scape, pronotum, fore and middle legs, metatarsus, and large areas on basal 1/2 of gaster; antennal pedicel and flagellum dark brown. *Head*: 1.3× as broad as high; clypeus with apical margin straight, curved slightly inward; anterior tentorial pits difficult to discern (due to black coloration of lower face); genal carina present, extending 0.5× eye height; malar space 0.44× eye height; ratio of lateral ocellus: ocellocular distance: postocellar distance as 16:13:38; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 22:7:2:21:16:16: 16:14:14:17. *Mesosoma*: 2.1× as long as broad, pronotum 0.8× as long as broad, mid lobe of mesoscutum and scutellum about as long as broad; notauli as a row of foveae and axillular grooves obliterated; femoral depression substrigulate; metapleuron foveate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with a narrow medial groove anteriorly (disappearing posterior-

ly); basal anterior portion of procoxa with large oblique depression, bordered mesally by a carinate ridge that forms a semicircle (convex side directed laterally); apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 75:26:13:9: 5:10; ratio marginal vein: postmarginal vein: stigmal vein as 30:41:17. *Metasoma*: Petiole about 4× as long as broad (about as long as metacoxa), parallel-sided but widened at base, then narrowed and widened again; gaster 2.4× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 17:15:14:19:13:15:7:5; hypopygium reaching 0.7× length of gaster, apical region of ventral line with 5 pairs of setae.

Male.—Unknown.

Diagnosis.—This species and *B. petiolata* are the only species in the genus where the female has an elongate petiole, but *B. nigracephala* is readily distinguished by its completely black head, a characteristic that is unique among species of *Bephrata*.

Variation.—Known from one female.

Type specimens.—Holotype, ♀ (USNM): ECUADOR, Orellana, Tiputini Biodiv. Station, nr N.P. Yasuni, 8.ii.1999, 220–250 m, Trans 4, Sta. 5, 00°37'55"S 76°08'39"W, T. Erwin et al., #2034, fog terre firme forest.

Etymology.—From the Latin for black and Greek for head, referring to the completely black head of this species.

Biology.—Unknown.

Distribution.—Amazon basin of Ecuador.

Bephrata noyesi Gates and Hanson, n. sp.
(Fig. 14)

Female holotype.—Body length 4.0 mm. *Color*: Head orange yellow below, black above toruli; antennal scape yellow, flagellum dark brown; mesosoma black except yellow on pronotum; fore and middle legs orange yellow, metacoxa and tarsus pale yellow, femur and tibia largely dark brown; petiole black; gaster yellow except terga 1 and 6–7 dark brown, Gt3–Gt4 dark brown dorsally (medially) with posterior band extending ventrally (laterally), Gt5

with narrow brown band posteriorly. Head: $1.3\times$ as broad as high; clypeus with apical margin straight, curved slightly inward; anterior tentorial pits small; genal carina present but fine, extending $1/3$ eye height; malar space $0.26\times$ eye height; ratio of lateral ocellus: ocellocular distance: postocellar distance as 20:10:31; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 28:9:2:20:19:19:19:17:14:17. Mesosoma: $1.85\times$ as long as broad, pronotum $0.7\times$ as long as broad, mid lobe of mesoscutum $0.9\times$ as long as broad, scutellum about as long as broad; notauli as a row of foveae and axillular grooves obliterated; femoral depression substrigulate; metapleuron foveate; propodeum alveolate (with numerous carinae forming irregular setose cavities), without an evident longitudinal groove in center, except at base; basal anterior portion of procoxa with large oblique depression, bordered mesally by a carinate ridge that forms a semicircle (convex side directed laterally); apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 41:14:8:6:4:6; ratio marginal vein: postmarginal vein: stigmal vein as 23:34:14. Metasoma: Petiole about as long as wide, gaster $2.9\times$ as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 18:9:15:21:22:30:2:4; hypopygium reaching $0.6\times$ length of gaster, apical region of ventral line with 5 pairs of setae.

Male.—Body length 3.2–3.4 mm. Color: as for female, except dorsal surface of pronotum partially to nearly completely black. Scape with very minute whitish oval area at apex; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each $2\text{--}3\times$ as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 31:6:2:32:32:30:26:26:22:25. Gastral petiole $2.8\times$ as long as broad, $0.8\times$ length of metacoxa, nearly parallel-sided, dorsal surface coriaceous; ratio of petiole:

Gt1–Gt7 (dorsal length measured in lateral view) as 18:30:16:10:9:10:1:4.

Diagnosis.—This is the only species of *Bephrata* in which the female petiole is quadrate. The male is quite similar to those of *B. christeri* and *B. lorraineae*, but can be distinguished from the latter by the absence of an apical knob on the scape, and from the former by the slightly shorter, reticulate petiole.

Variation.—Female length ranges 3.8–5.3 mm in length. Two of the three specimens from Ecuador (Tiputini Biodiversity Station) are either variants of this species or a new species. Both are females and the last two flagellomeres are darker than the preceding ones, the vertex is less black (restricted to the ocellar region instead of being all black), and the pronotum has a black spot in the middle (instead of being almost entirely yellow).

Type specimens.—Holotype, ♀ (USNM): COLOMBIA, Amazonas, 150 m, Parque Nacional Natural Amacayacu Matamata, San Martin, $3^{\circ}23'01''\text{N } 70^{\circ}06'01''\text{W}$, 2–10.x.2000, B. Armando, M.843.

Paratypes, 9♀, 4♂: same data as for holotype except 10–18.x. 2000, M.835 (2♀, USNM); 19–26.iii.2000, M.82 (1♂, IAVH); 300 m, 19–28.iii.2000, A. Parente #99 (1♂, USNM); 6–15.iv.2000, M84 (1♀, IAVH); 24.iv–5.v.2000, M88 (1♂, USNM); 2–8.v.2000, #682 (1♀, USNM); 8–14.viii.2000, #689 (1♀, IAVH); 15–23.x.2000, #849 (1♀, USNM). ECUADOR, Napo, Tiputini, Biodiversity Station, 216 m, $00^{\circ}37'55''\text{S } 76^{\circ}08'39''\text{W}$, 23.x.1999, Lot 1914 Transect 2, T. Erwin et al., Canopy fogging (1♀, USNM); 6.ii.1999, Lot 2068 Tans 7 (1♀, USNM); 220–250 m T8/Sta.4, 4.vii.1998, Lot 1873 (1♀, USNM); PERU, Loreto, 1 km SW Boca del Rio Samiria, Vigilante Post #1, 31.viii.1991, $04^{\circ}40'29''\text{S } 74^{\circ}18'54''\text{W}$, T. Erwin fogging, 130 m, Lot 74 (1♂, USNM).

Etymology.—Named in honor of John Noyes, for his contributions to our knowledge of Neotropical Chalcidoidea.

Biology.—Unknown.

Distribution.—Upper Amazon basin of Colombia, Ecuador, and Peru.

Bephrata nublada Gates and Hanson, n. sp.
(Figs 15, 53)

Female holotype.—Body length 5.2 mm. Color: Black/dark brown: flagellum, occiput, lateral lobe of mesoscutum in medial 1/2, mesoscutum, medial 3/4 axilla, scutellum, propodeum, mesepimeron, metapleuron, metatibia except tips, Gt₁, Gt₄, apical 2/3 Gt₅, apical 2/3 syntergum, ovipositor sheaths, midline of hypopygium; orange: scape, pedicel, pronotum, prepectus, tegula, mesepisternum, lateral 1/2 lateral lobe of mesoscutum, lateral 1/4 axilla, legs; pale yellow: coxae, remainder of gaster, Fore wings hyaline with infusate cloud in disc posterad stigmal vein. Head: 1.3× as broad as high; clypeus with apical margin straight, with notch on each side, anterior tentorial situated in notch; genal carina present, extending 0.5× eye height; malar space 0.5× eye height; ratio lateral ocellus:ocellocular distance:postocellar distance as 10:6:25; scape reaching just above anterior ocellus; ratio scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: club as 42:11:3:24:18:17:17:15:14:48 (Fig. 15). Mesosoma: 2.8× as long as broad, pronotum 0.5× as long as broad, mid lobe of mesoscutum about as long as broad, scutellum about as long broad; notauli obliterated posteriorly, barely evident anteriorly; axillular grooves obliterated; scutellum with foveae very shallow and sparse (interstices broad); femoral depression weakly coriarius-substrigulate, adscrobal carina weak, ventral-posterior epicnemium with relatively few foveae; metapleuron alveolate; propodeum with numerous carinae forming irregular setose cavities, median channel shallow, widest medially, with irregular longitudinal striae; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 103:43:22:13:8:19; ratio marginal vein:postmarginal vein:stigmal vein as 35:67:31. Metasoma: Petiole with

dorsal length 0.3× as long as broad, produced anterolaterally into dull prongs; gaster about 3.6× as long as high; ratio of Gt₁–Gt₇, ovipositor sheath (all measured dorsally): 20:34:60:73:32:48:19; hypopygium reaching about 0.75× length of gaster, apical region of ventral line with 9 pairs of setae.

Male.—Body length 4.6 to 5.3 mm. Color: dark areas of gaster described for female more extensive dorsally. Sculpture as for female, except prodeum medially with more longitudinal rugosity and fine carinae. Scape with light colored oval area opposite insertion of pedicel, this area protruding as a knob; flagellomeres pedicellate with a basal and an apical whorl of erect setae each 3–4× as long as width of segment; ratio scape (minus radicle): pedicel: anellus: F1–F6: clava as 40:8:3:34:34:34:34:30:26:32. Gastral petiole 3.1× as long as broad, 0.7× as long as metacoxa; parallel-sided, dorsal surface weakly coriarius especially on basal 1/2; ratio of petiole: Gt₁–Gt₇ (dorsal length measured in lateral view) as 27:28:18:18:18:6:11:10

Diagnosis.—*Bephrata nublada* is the only species known having an infusate spot on the fore wing.

Variation.—Female length ranges 5.2–5.4 mm. There is little color variation in the type material.

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Prov. Limón, Parque Internacional La Amistad, Valle del Silencio, Zona de Acampar, 2450 m, 18.iv.2001, J. Azofiefa, Trampa de Luz, L_S_341250_577200, #63242.

Paratypes, 1♀, 5♂: same data as for holotype (2♂, MZCR, USNM); COSTA RICA, Puntarenas, Bahía Wafer, Isla del Coco, 1 m, vii.2001, Y. Camacho, Malaise, Long_87:03:30.0000 Lat_5:32:45.0000 #3243 (1♀, 2♂, INBio); Bahía Chatan, Isla del Coco, 5–9.ii.1993, L-S 0,0, INBio CRI001851156 (1♂, INBio).

Etymology.—This species is named for the cloudy infuscation in the fore wing.

Biology.—Host unknown.

Distribution.—Costa Rica.

Bephrata petiolata Gates and Hanson, n. sp.
(Figs 16, 55)

Female holotype.—Body length 4.0 mm. Color: Head yellow below, black above anterior ocellus; scape yellow, rest of antenna orange yellow except last funicular segment and clava which are dark brown; mesosoma black except yellow pronotum (small black spot in middle); legs yellow except for black metatibia; petiole black; gaster yellow except terga 1 and 6–7 dark brown, Gt2–Gt5 dark brown dorsally (medially) with posterior band extending ventrally (laterally). Head: $1.3\times$ as broad as high; clypeus with apical margin straight, curved slightly inward; anterior tentorial pits small; genal carina present, extending $0.5\times$ eye height; malar space $0.4\times$ eye height; ratio of lateral ocellus: ocellocular distance: postocellar distance as 17:12:30; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 23:7:2:21:16: 15:15:14:11:14. Mesosoma: $2.1\times$ as long as broad, pronotum $0.7\times$ as long as broad, mid lobe of mesoscutum $0.7\times$ as long as broad, scutellum about as long as broad; notauli as a row of foveae and axillular grooves obliterated; femoral depression substrigulate; metapleuron foveate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with a faint, narrow, longitudinal groove in center; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carinate ridge that is laminate distally; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 75:28:15:9:4:10; ratio marginal vein: postmarginal vein: stigmal vein as 6:10:4. Metasoma: Petiole about $5\times$ as long as wide (about as long as metacoxa), parallel-sided but widened at base, then narrowed and widened again; gaster $2.4\times$ as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 21:11:13:16: 11:16:6:6; hypopygium reaching $0.7\times$

length of gaster, apical region of ventral line with 6 pairs of setae.

Male.—Unknown

Diagnosis.—This species and *B. nigracephala* are the only species of *Bephrata* where the female has an elongate petiole, but *B. petiolata* is readily distinguished by its yellow face (as opposed to black in *B. nigracephala*).

Variation.—Female length ranges 3.6–4.1 mm in length. The size of the black spot on the pronotum and the degree of contrast in the colors of the antennal flagellum vary somewhat.

Type specimens.—Holotype, ♀ (EPNC): ECUADOR, Orellana, Tiputini, Biodiversity Station, 216 m, $00^{\circ}37'55''\text{S}$ $76^{\circ}08'39''\text{W}$, 23.x.1998, Lot 1901 Trans 1, T. Erwin et al., Canopy fogging bare leaves, some w/ bryophytic/lichenous coat.

Paratypes, 3♀: same data as for holotype except Lot 1916, Trans 3 (1♀, EPNC); 220–250 m, 1.vii.1998, Trans 6, Sta.1, #1850 (1♀, USNM); Napo, Reserva Ethnica Waorani, Transect Ent., 1 km S. Okone Gare camp, $00^{\circ}39'10''\text{S}$ $76^{\circ}26'0''$, 220 m, 2.vii.1995, Lot #1090 (1♀, USNM).

Etymology.—Named for the elongate petiole of this species.

Biology.—Unknown.

Distribution.—Amazon basin of Ecuador.

Bephrata ruficollis Cameron
(Figs 17, 28–30, 32–39, 46)

Bephrata ruficollis Cameron 1884: 109. Lectotype ♀, designated below. Panama, V. de Chiriqui (BMNH).

Female lectotype.—Body length 6.8 mm. Color: Orange except following areas black: vertex transversely encompassing posterior ocelli, mesoscutum, scutellum, dorsellum, propodeum, petiole, gastral terga dorsally; or dusky: apical three flagellomeres. Head: $1.3\times$ as broad as high; clypeus with apical margin minutely emarginate; anterior tentorial pits small; genal carina present but short, extending to venter of eye (Fig. 34); malar space $0.4\times$ eye height (Fig. 33); ratio lateral ocellus: ocellocular distance: postocellar distance as

14:24:6; scape reaching just to anterior ocellus; ratio scape (minus radicle): pedicel: anellus: F1:F2:F3:F4:F5:F6: club as 40:10:2:35:26:30:20:15:14:31 (Fig. 37). Mesosoma: 2.3× as long as broad, pronotum 0.5× as long as broad, mid lobe of mesoscutum 1.3× as long as broad, scutellum 1.3× as long as broad; notauli mostly obliterated (evident only as shallow impressions), axillular grooves evident as rows of foveae; femoral depression substrigulate, ventral-posterior epicnemium with relatively few foveae; metapleuron alveolate; propodeum with numerous carinae forming irregular setose cavities, median channel broad, rugulose with a few cross carinae forming asetose cells; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 150:45:25:12:8:19; ratio marginal vein: postmarginal vein: stigmal vein as 70:105:48 (Fig. 38). Metasoma: Petiole 0.2× as long as broad, unproduced anterolaterally (Fig. 32); gaster about 3× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 40:70:45:65:80:40:20:10; [hypopygium nearly reaching 0.9× length of gaster, apical region of ventral line with 15–18 pairs of setae].

Male.—Body length 4.1 to 6.2 mm. Color: Black areas of gaster described for female more extensive dorsally; antenna entirely black except tip of clava whitish. Scape with light colored ventral plaque in apical 1/3, not protruding as knob; flagellomeres elongate and of uniform width (Fig. 46), the shortest 5.6× as long as broad, evenly covered with suberect setae each ~1.0× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1–F6: clava as 45:10:3:58:55:55:50:48:46:45 (Fig. 46). Gastral petiole 2.7× as long as broad, subequal in length to metacoxa, nearly parallel-sided but broadest medially, dorsal surface weakly coriaceous to nitid; ratio of petiole: Gt1–Gt7

(dorsal length measured in lateral view) as 32:30:23:25:15:18:12:15.

Diagnosis.—*Bephrata ruficollis* has the metatibia completely yellow and is the only species in which the clava is white, differing from the other brown/black flagellomeres.

Variation.—Female length ranges 5.0–7.0 mm. Some females have more extensive maculation encompassing the occiput along with reduced dorsal maculation on the gaster, particularly anteriorly. The median channel in the aforementioned specimens possess smoother sculpture. One male has a circular black maculation dorsomedially on the pronotum.

Type specimens.—Lectotype ♀, here designated (BMNH): V. de Chiriqui, 3–4,000 ft., Champion, P. Cameron coll. 1914–110, B.M. Type Hym. 5.313 (Panama).

Other specimens examined.—COSTA RICA: Guanacaste, Estación Pitilla, 9 km S. Santa Cecilia, 700 m, ix.1988, I. Gauld (3♂, MZCR); Heredia, F. La Selva, 3 km S. Puerto Viejo, 10°26'N 84°01'W, 3.vii.1986, dead trees, H. A. Hespenheide (1♀, USNM); F. La Selva, 3 km S. Puerto Viejo, 10°26'N 84°01'W, 1.iv.1980, H. A. Hespenheide (1♀, USNM); La Selva Biological Station, 3 km S. Puerto Viejo, 10°26'N 84°01'W, 23.iv.1989, H. A. Hespenheide (1♀, USNM); Estación Biológica La Selva, 50–150 m, 10°26'N 84°01'W, Proy. ALAS, INBio -OET, M/05/352, 15.ii.1994, bosque primerio (1♀, INBio); Puerto Viejo, La Selva, 100 m, i–ii.1991, P. Hanson (2♀, MZCR); Chilamate, 75 m, vii–viii.1989, P. Hanson (3♀, MZCR); same locality as preceding but dates as: xii.1989–iii.1990 (2♀, 2♂, USNM); ix–x.1989 (2♀, 2♂, MZCR); vii–x.1990 (1♂, MZCR); Reserva Biológica Carara, Estación Quebrada Bonita, 50 m, v–vi.1989, P. Hanson (1♂, USNM); Golfo Dulce, 24 km W. Piedras Blancas, 200 m, ix–xi.1989, Hanson (1♂, USNM); same locality but dates as: vi–viii.1989 (1♂, USNM); San Vito, Jardín Botánico Las Cruces, vii–viii.1988, 1200 m, P. Hanson (2♀, 3♂, USNM); same locality but dates as: viii–ix.1988 (2♀, USNM); 5.vi.1988 (1♀, USNM); vi–vii.1988 (1♀, 1♂, USNM); xii.1988 (2♀, USNM); Golfito, Parque Nacional Corcovado, Sendero a Sirena, 100 m, 15.vi–15.vii.2000, L_S_514200_276500, J. Azofiefa, Malaise, # 57968 (1♀, USNM); San José,

Ciudad Colón, 800 m, ii.1990, L. Fournier (1♂, MZCR); same locality but dates as: iv–v.1990 (2♀, MZCR); xii.1989 (1♀, MZCR). ECUADOR, Napo, Tiputini Biodiversity Station, 216 m, 5.ii.1999, 00°37'55"S 76°08'39"W, Lot 2096, Transect 10, T. Erwin et al., canopy fogging bare leaves, some with bryophytic/lichenous coat (1♀, USNM); Reserva Etnica Waorani, Transect Ent. 1 km S. Okone Gare Camp, 220 m, 00°39'25.7"S, 76°27'10.8"W, 7.ii.1996, T. Erwin et al., #1443, t5.3, terre firme forest (1♂, EPNC). VENEZUELA, San Esteban, xi.1939, Pablo Anduze (2♀, USNM).

Biology.—Host unknown.

Distribution.—Costa Rica, Ecuador, Panama, and Venezuela.

Bephrata stichogaster Gates and Hanson, n. sp.
(Fig. 18)

Female holotype.—Body length 5.6 mm. Color: Head yellow except black spot below eye, area from scrobe to ocelli, and occiput; clava darker than rest of antenna; mesosoma black except yellow on lateral surface of pronotum; legs yellow except metatibia black; petiole black; gaster with terga 1, 6 and 7 dark brown, Gt2–Gt5 dark brown dorsally (medially) with broad, longitudinal, pale band laterally followed by dark band below. Head: 1.3× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present but weak, extending 0.5× eye height; malar space 0.4× eye height; without evident line between anterior ocellus and scrobal basin; ratio of lateral ocellus: ocellocular distance: postocellar distance as 19:15:36; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 26:9:2:19:17:17:17:16:14:19. Mesosoma: 1.9× as long as broad, pronotum 0.7× as long as broad, mid lobe of mesoscutum and scutellum, each about as long as broad; notauli and axillular grooves mostly obliterated; femoral depression substrigulate-coriarius; metapleuron alveolate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with a broad, relative-

ly deep, weakly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina that is laminate distally; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 85:32:15:9:5:12; ratio marginal vein: postmarginal vein: stigmal vein as 17:25:11. Metasoma: Petiole very transverse, produced laterally as upturned spurs; gaster 4.7× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 35:28:24:27:34:15:14:8; hypopygium reaching 0.8× length of gaster, apical region of ventral line with 8 pairs of setae.

Male.—Body length 4.2–5.2 mm. Color: as for female, except head sometimes completely black from scrobe to occiput, gaster often darker with pale lateral stripe less evident, and metatarsi sometimes dark. Scape with whitish oval area opposite insertion of pedicel, but not protruding as a knob; flagellar segments elongate and of uniform width, evenly covered with sparse suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 20:5:2:19:19:18:17:15:13:15. Gastral petiole 3.9× as long as broad, 1.1× length of metacoxa, parallel-sided, dorsal surface mostly nitid, weakly coriarius at base; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 35:26:20:19:20:18:13:10.

Diagnosis.—This species is most similar to *B. leptogaster* in that both species have a very narrow, elongate gaster; however, the fore wing veins of *B. leptogaster* are very thin, whereas the veins of *B. stichogaster* are more like those of other *Bephrata*; the males of *B. leptogaster* have transverse wrinkles on the mesoscutum and scutellum, whereas the sculpture of *B. stichogaster* is more like that of other *Bephrata* (foveate). Females are readily distinguished from other *Bephrata* by the longitudinal, pale stripe on the side of the gaster. However, this stripe is often less evident in males, making them more difficult to distinguish from other *Bephrata*, especially *B. christeri* which also

lacks a protruding knob on the apex of the scape and has a shiny petiole; the latter species usually has the mesoscutal lobes orange (reddish) yellow, whereas in *B. stichogaster* the entire mesoscutum is black.

Variation.—Female length ranges 4.6–6.6 mm in length. Some specimens of both sexes have the top of the head completely black, as opposed to having at least some yellow between the ocellar area and the occiput; the dorsal pronotum varies from nearly all black (sides yellow) to entirely black. Some specimens, especially in males, have the metacoxa black and sometimes also a black spot the metafemur. The male flagellum is usually yellowish brown but in a few individuals it is black.

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Heredia, Estación Biológica La Selva, 100 m, 10°26'N 84°01'W, 14.x.1994, FPM 23.

Paratypes, 15♀, 15♂: same data as for holotype except 23.vi.1985, H. A. Hespeneheide (1♀, USNM); Alajuela, 5 km W San Ramon, 1200 m, x.1996, O. Castro and P. Hanson (1♀, MZCR); vi.1997 (1♀, MZCR); vii.1997 (1♀, USNM); Guanacaste, Bara Honda, 200 m, v.1988, Gauld and Mitchell (2♀, MZCR); Rio San Lorenzo, 1050 m, Tierras Morenas, Z.P. Tenorio, xi.1992, G. Rodriguez, LN 287800 427600 (1♀, INBio); Z. P. Nasara, Sendero La Ceiba, 600 m, 16.viii–21.ix.2001, I. Jimenez, LN 221100 382950 (1♂, INBio); San Jose, Zurqui de Moravia, 1600 m, vii.1991, P. Hanson (1♂, MZCR); Rio Sur, 160 m, Reserva Biológica Carara, ii–iii.1990, LN 194300 478250 (1♂, INBio); Puntarenas, San Luis, Monteverde, 1000–1350 m, ii.1995, Z. Fuentes, LN 250850 449250 (1♂, INBio); Reserva Natural Cabo Blanco, Estación San Miguel, ix.1993, M. Ramirez, LS 173174 411412 (1♀, BMNH); Buenos Aires, Parque Internacional La Amistad, Estación Altamira, Cerro Quemado, 2279 m, 13.xi–13.xii.2001, D. Rubi, LS 336200 575560 #66667 (2♂, INBio). COLOMBIA, orchid, in cargo, 8.viii.1940, Hoboken, #239 (2♂, USNM); 6.viii.1940, #224 (1♂, USNM). MEXICO, Veracruz, Estación Biológica Los Tuxlas 18°35'N 95°05'W, 25.iv.1991, H. A. Hespeneheide (1♀, USNM); ca. 15 km N of Catemaco, 15–17.ix.1987, A. L. Norrbom (1♀, USNM); 33 km NE Catemaco, 160 m, 1.vii.1983, M. Kaulbars

(1♂, USNM); Martinez de la Torres, with *Philodendron* cane, Randolph, 24.ix.1947, Laredo, Texas, No. 44943 (1♂, USNM); V.C., Laredo port of entry, 1.v.1962, orchid (1♂, USNM); San Luis Potosi, with orchid plants from Tamazunchela, Laredo, Tx., No. 46983, Lewis, 31.vii.1948 (1♂, USNM); in pseudobulb of *Laelia* sp. from Mexico, Brownsville #66607, at airport, 22.vii.1948 (2♀, USNM); with orchid plants from Mexico, Randolph, 22.ix.1947, Laredo, No. 44901 (1♀, USNM); orchid plants, Mexico, Brownsville, Texas 75661, 13.iv.1954, 4094 (1♂, USNM); Laredo POE, 23.v.1955, on orchid, Watt (1♀, USNM). PANAMA, Canal Zone, Barro Colorado Island, 9°10'N 79°50'W, 20.vi.1977, H. A. Hespeneheide (1♂, USNM). TRINIDAD AND TOBAGO, Tunapuna, Mt. St. Benedict, 500 m, 21.vi–8.vii.1993, Tapor rain forest MT, S. and J. Peck (1♂, CNC). UNKNOWN, Miami, Fla., Port, on window, 17.viii.1965, L. A. McClain (1♀, USNM). VENEZUELA, with wild orchids, Hoboken, #252, 13.viii.1940 (1♀, USNM).

Etymology.—From the Greek *stichos* for line, referring to the pale longitudinal line on the side of the gaster,

Biology.—Host unknown. Many specimens were collected at port-of-entries associated with orchids, two of them “in pseudobulbs of *Laelia* sp.” from Mexico. Another Mexican specimen was collected in association with *Philodendron* (Araceae) “canes”.

Distribution.—Colombia, Costa Rica, Mexico (Veracruz, San Luis Potosí), Panama, Trinidad and Tobago, and Venezuela. In Costa Rica, this species occurs in both wet and seasonally dry forests from sea level to 1200 m, although there is one male from 1600 m which has somewhat aberrant coloration (e.g., the flagellum completely black).

Bephrata ticos Gates and Hanson, n. sp.
(Fig. 19)

Female holotype.—Body length 6.0 mm. **Color:** Head yellow except black from scrobe to back of head and a small spot below eye; antennal flagellum dark brown; pronotum mostly black dorsally and yellow laterally; mesoscutum and scutellum orange (reddish) yellow except for thin black line in middle and broad band at

anterior end of mid lobe; mesopleuron, metapleuron, and propodeum black; legs yellow except metatibia black; petiole black; gaster yellow except terga 1 and 7 dark brown, Gt2–Gt6 dark brown dorsally (medially), Gt3–Gt5 with posterior band extending ventrally (laterally). Head: 1.4× as broad as high; clypeus with apical margin straight; anterior tentorial pits small; genal carina present but weak, extending about 1/4 eye height; malar space 0.35× eye height; ratio of lateral ocellus: ocellular distance: postocellar distance as 22:19:44; antenna with scape reaching middle of anterior ocellus; ratio of scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 20:6:2:18:16:16:16:15:14:19. Mesosoma: 1.9× as long as broad, pronotum 0.5× as long as broad, mid lobe of mesoscutum and scutellum each about as long as broad; notauli and axillular grooves evident as weak lines beneath surface sculpture; femoral depression substrigulate, more strongly sculptured on anterior margin; metapleuron alveolate; propodeum alveolate (with numerous carinae forming irregular setose cavities), with a broad, shallow, weakly sculptured median channel; basal anterior portion of procoxa with large oblique depression, bordered mesally by a sinuous carina that is laminate distally; apex of metatibia with a short pointed spur; ratio metatibia: metatarsomeres as 50:22:10:5:3:8; ratio marginal vein: postmarginal vein: stigmal vein as 16:22:11. Metasoma: Petiole very transverse, produced laterally as upturned spurs; gaster 3.4× as long as high; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:22:15:35:35:22:15:9; hypopygium reaching 0.75× length of gaster, apical region of ventral line with 10 pairs of setae.

Male.—Body length 4.2–4.7 mm. Color: as for female, except gaster darker. Scape with whitish oval area opposite insertion of pedicel that protrudes as a prominent knob; flagellar segments elongate and of uniform width, evenly covered with sparse

suberect setae, each 2–3× as long as width of corresponding segment; ratio scape (minus radicle): pedicel: anellus: F1: F2: F3: F4: F5: F6: clava as 20:4:1:19:20:20:19:15:13:15. Gastral petiole 3.9× as long as broad, same length of metacoxa, parallel-sided, dorsal surface mostly nitid, weakly coriarius at base; ratio of petiole: Gt1–Gt7 (dorsal length measured in lateral view) as 35:31:22:22:20:12:16:14.

Diagnosis.—The combination of an orange (reddish) yellow mesoscutum and scutellum, with a black mesopleuron and propodeum is unique; only *B. bahiae* has a similar color pattern, but in this latter species the mesoscutum and scutellum are pale yellow, and there is less black on the head and pronotum.

Variation.—Female length ranges 5.7–6.1 mm in length and show relatively little variation in color, principally whether or not there is a thin, black medial line present on the mesoscutum and scutellum.

Type specimens.—Holotype, ♀, (USNM): COSTA RICA, Puntarenas, San Vito, Estación Biológica Las Alturas, 1500 m, vii–viii.1991, P. Hanson.

Paratypes, 32♀, 10♂: same data as holotype (1♀, 1♂, MZCR); xi.1991 (1♀, MZCR); iii.1992 (2♀, 2♂, MZCR); v.1992 (4♀, 2♂, USNM); vi.1992 (3♀, BMNH); xi–xii.1992 (1♀, CNC); iii.1993 (1♀, CNC); iv.1993 (1♂, BMNH); iii.1992, M. Ramirez, LS 322500 591300 (1♀, INBio); viii.1992, M. Ramirez and E. Sancho (3♀, INBio); 3–4.ix.1992, E. Sancho (1♂, INBio); Buenos Aires, Parque Internacional La Amistad, Sendero Gigantes, 1460 m, 9.viii–9.ix.2001, D. Rubí, LS 331800 572100 (7♀, INBio); 9.vii–9.viii.2001 (1♀, INBio); 10.vi–10.vii.2001 (1♂, INBio); Estación Altamira, 1320 m, x.1994, M. Segura and Z. Fuentes, LS 331700 572100 (1♀, INBio); Area de Conservacion Amistad, Sector Altamira, 1 km S.O. del Cerro Billy, 1400 m, x.1994, M. Segura, LS 331500 571700 (1♀, INBio); Parque Internacional La Amistad, 1400 m, viii.1994, R. Delgado, LS 332700 572400 (1♀, INBio); Parque Internacional La Amistad, Finca Cafrosa, 1100 m, iv–x.1989 (2♀, 1♂, MZCR); RF Golfo Dulce, 3 km SW Rincón, 10 m, xii.1992, Hanson and Godoy (1♀, USNM); Parque Nacional

Corcovado, Estación Sirena, 0–100 m, 9–27.vii.1992, A. Gutierrez, LS 270500 508300 (1♂, USNM); San José, Zurquí de Moravia, 1600 m, v.1996, Hanson and Godoy (1♀, USNM).

Etymology.—Noun in apposition named for the local slang term, “ticos”, used to denote inhabitants of Costa Rica.

Biology.—Host unknown.

Distribution.—*Bephrata ticos* is presently known only from Costa Rica; the vast majority of specimens (42) are from montane sites (1100–1600 m), primarily the Talamanca Mountains, although there are two from lowland sites (Osa Peninsula).

Isosomodes Ashmead

Isosomodes Ashmead 1888: 42, 43. Type species:

Isosoma gigantea Ashmead, by subsequent monotypy.

Description (females).—Length 3.5–7.5 mm. **Color:** Usually a combination of yellow, orange, and black, sometimes completely dark brown/black; middle terga of gaster often with black band along posterior margin (appearing like vertical tiger stripes), becoming weaker ventrally (Figs. 20–27). **Sculpture:** head (except gena), dorsal mesosoma, lateral and posterior part of epicnemium, metapleuron, and lateral areas of propodeum covered with setigerous foveae (‘umbilicate punctures’), interstices appearing microreticulate at low magnification (Fig. 72); supraclypeal area usually without striae converging on clypeus (Fig. 68), occasionally few fine striae present, gena and lateral panel of pronotum weakly sculptured, imbricate to reticulate with occasional fovea; prepectus weakly sculptured, shallowly concave along dorsoventral axis; femoral depression coriarius, foveolate and/or substrigulate, mesepimeron substrigulate to foveolate, sometimes smooth (Figs. 72, 75); metepimeron and lateral areas of propodeum deeply foveate; coxae weakly sculptured, usually imbricate to reticulate; metatibia appearing longitudinally rugose from presence of raised, elongate carinae; metasoma nitid, often finely imbricate

posteriorly (Fig. 67). **Head:** slightly wider than high in frontal view; mandible with two pointed teeth ventrally and a truncate tooth dorsally; anterior clypeal margin straight and/or notched (Fig. 68); torus situated above middle of eye and antennal scape often extending above vertex; intertorular space narrow, with a semicircular plate/carina extending to base of scape, continuing as raised lineation to near middle of scrobal basin but becoming very weak and often difficult to discern dorsally; scrobal basin very weakly sculptured, carinate laterally; anterior ocellus situated adjacent to scrobal basin, separated by at most foveate sculpture; malar sulcus distinct, complete; gena convex, genal carina usually absent, at most present as slight angulation near oral fossa. Antennal scape at least 1.2× longer than first funicular segment, anellus transverse to quadrate, 6 funicular segments longer than wide, becoming quadrate apically, F6 usually appressed to clava but distinct (Fig. 60); clava with 3 fused segments; first funicular segment tapered at base, usually ~1.5× longer than broad; funicular segments and clava with 1–2 irregular, overlapping rows of longitudinal sensilla (MPS), covered with subdecumbent setae, about 0.8–1.0× width of corresponding segment; apex of clava with fine ‘crown’ of microsetae, sometimes directed apicoventrally (Fig. 60; see *I. azofiefai*, *I. colombia*). Head posteriorly with lateral foraminal plates distinct dorsally, indistinct laterally, extending no more than 1/4 length postgenal bridge sulci; postgenal bridge sulci deep and complete, bridge ornamented with digitiform cuticular expansions; postgenal present, straight, indistinct dorsally, postgenal lamina absent (cf. Figs. 34–36). **Mesosoma:** About twice as long as wide (length 2.3–2.7× width), dorsal surface quite straight in lateral view, scutellum flat (Fig. 75), propodeum usually sloping gently downward, anterior 1/2 nearly coplanar with scutellum; notauli typically obliterated posteriorly and indicated ante-

riorly by shallow groove or sculpture; axillular groove obliterated anteriorly, deep posteriorly; lateral surface of prepectus triangular, narrow posteriorly, with posterior corner rounded; subventral carina of prepectus visible in lateral view; epicnemium in lateral view broad and evenly curved, without a differentiated mesopleural shelf (just a simple transverse carina in front of mesocoxae; Fig. 77); femoral depression of mesopleuron shallowly concave, usually demarcated anteriorly by adscrobal carina (rarely absent). Procoxa convex anteriorly, laminate anteroapically (Fig. 75); metafemur about $3\times$ as long as wide; metatibia with two pointed, apical spurs. Fore wing with postmarginal vein longer than marginal vein, stigmal vein slightly shorter than marginal vein, speculum and basal cell setose (like rest of wing) (Figs. 76, 79). Metasoma: with petiole usually asetose, but some sometimes (*I. brasiliensis*, *I. parkeri*) with paired fine setae anterodorsally, and usually subequal to longer than broad (elongate in *I. similis*); gaster elongate (length $2.7\text{--}4.0\times$ height), sclerotized, usually not collapsing and often compressed dorsoventrally (especially anteriorly) such that cross section is triangular to ovate; gastral terga 3–6 usually somewhat similar in length with 1–2 shortest; hypopygium nearly always at midlength of gaster, ventral line with 2–4 pairs of setae; ovipositor sheaths slightly tilted upward at apex, terminating posterad Gt7.

Males.—Presently known for seven of eight species (unknown for *I. paradoxus*). Usually slightly smaller and darker (especially gaster) than female. Antennal scape lacking any light-colored oval area at apex (opposite insertion of pedicel), flagellomeres either parallel sided or asymmetrically pedicellate, usually at least somewhat narrowed at each end, with erect setae at least $1\text{--}4\times$ width of corresponding flagellomere (Figs. 61, 62, 66).

Comments.—The number of setae on the apex of the hypopygium is a fairly reliable

and previously unreported means of separating *Bephrata* (5 or more pairs of setae) from *Isosomodes* (2–4 pairs); the only exception is *B. citri*, which appears to have only three pairs of setae, although this is based on the observation of just one specimen (the only specimen with an exposed hypopygium).

Biology.—The specimens examined were collected by Malaise trap, hand net, canopy fogging and, less commonly, rearing from eggs; none were collected at lights. The only host record is of *I. gigantea*, from eggs of *Bucrates capitatus* (De Geer) (Orthoptera: Tettigoniidae).

Distribution.—In the New World, species of *Isosomodes* have been collected from USA (Maryland) to Ecuador. They occur primarily in the lowlands with some species occurring at mid altitudes.

Isosomodes azofiefai Gates and Hanson, n. sp.
(Figs 20, 60, 61, 75–78)

Female holotype.—Body length 6.0 mm. Color: Black: F5–F6, clava, head, collum, most of gaster; dark orange: mesosoma except median channel of propodeum blackish; golden: F1–F3 (scape, pedicel, and F4 dusky), tegula, legs, Gt1–2 laterally and ventrally, Gt1 with dorsal spot (Fig. 20). Head: $1.4\times$ as broad as high, clypeus with apical margin straight, slightly notched; malar space and gena finely reticulate with foveae more widely spaced, clypeus smooth; anterior tentorial pits present, small; malar space $0.5\times$ eye height; scrobal basin carinate ventrolaterally; ratio of lateral ocellus:ocellular distance:postocellar distance as $10:5:22$; antenna (Fig. 60) with scape barely reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus: F1:F2: F3:F4:F5:F6:club as $42:14:5:20:15:16:15:13:12:33$; funiculars longer than broad; F1 slightly narrowed basally, plate sensilla present in basal $1/3$; clava bisegmented, fused, with apical pilosity directed anteroventrally (Fig. 60). Mesosoma: $2.5\times$ as long

as broad, pronotum $1.1\times$ as long as broad, mid lobe of mesoscutum $1.4\times$ as long as broad, scutellum $1.1\times$ as long as broad; notauli impressed anteriorly, obliterated posteriorly, axillar grooves deep posteriorly, internalized anteriorly and not visible; femoral depression smooth subfoveolate; metapleuron deeply foveate; propodeum foveate, with narrow, laterally carinate median channel, incomplete cross carinae along its length; mesopleuron somewhat smooth anteriorly, bordered by irregular foveae, becoming glabrous posteroventrally and striate posterodorsally; ratio metatibia: metatarsomeres as 115:45:20:16:6:12; ratio marginal vein:postmarginal vein:stigmatal vein as 30:75:25 (Fig. 76). **Metasoma:** "humpbacked" in lateral view, ovipositor directed slightly dorsad horizontal (Fig. 77); gaster about $3.5\times$ as long as high, gastral petiole $0.6\times$ as long as broad, dorsally rugose and produced anterolaterally into flattened prongs; ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 20:17:32:46:23:50:18:10; hypopygium reaching $0.6\times$ length of gaster, apical region of ventral line with 2 pairs of setae.

Male.—Body length 4.7 to 6.0 mm. **Color:** as for female, except yellow areas of gaster described for female more extensive ventrally (Fig. 78); scape and pedicel dusky, flagellum entirely black; flagellar segments (Fig. 61) pedicellate with a basal and an apical whorl of erect setae each $3-4\times$ as long as width of segment; ratio scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:club as 38:10:3:38:33:35:34:30:25:30. Gastral petiole $2.4\times$ as long as broad, broadest medially, reticulate dorsally fading to glabrous ventrally, subequal in length to metacoxa; ratio of petiole (dorsal length measured in lateral view), Gt1–Gt7 (all measured dorsally): 61:22:15:27:50:32:30:11.

Diagnosis.—This species is unique in that the female clava is angulate apically. The males are similar to *I. landoni*, except the flagellomeres are asymmetrically sided with setae $2-3\times$ the length of the corre-

sponding segment (parallel-sided and $\leq 2\times$ in *I. landoni*).

Variation.—Female length ranges 5.5–7.5 mm and in extent of maculation that is present in the median channel of and posterodorsally on the propodeum, and laterally on the gaster. Occasionally, F4 is dusky. Male coloration varies primarily in the extent of the darker maculation on the propodeal/scutellar region and on the dorsum of the gaster.

Type specimens.—Holotype, ♀ (USNM). COSTA RICA, Puntarenas, Golfo Dulce, 24 km W. Piedras Blancas, 200 m, iii–v.1989, P. Hanson.

Paratypes, 18♀ 16♂: COSTA RICA, Alajuela, San Carlos, La Fortuna, PN Arenal, Sector Catarata, 500 m, 15.iii–24.iv.2001, G. Carballo, L_N_4625000_268500, #62077 (1♂, INBio); Guanacaste, Bagaces, Parque Nacional Palo Verde, Sector Catalina, Fila Catalina, 200 m, 09.iv–v.2001, Jiménez, Malaise, L_N_2574000_400000, #62262, INBio CRI0003704900 (1♀, INBio); Parque Nacional Guanacaste, 9 km S. Sta. Cecilia, Estación Pitilla, 700 m, 31.iii–15.iv.1992, P. Rios, L_N_330200, 380200, INBio CRI000771498 (1♂, INBio); Heredia, Puerto Viejo, La Selva, 100 m, I.1991, J. Noyes (1♀, BMNH); 3 km S. Puerto Viejo, OTS-La Selva, 100 m, 17.vii.1995, P. Hanson (1♀, MZCR); same as preceding, but viii–ix.1993 (1♀, MZCR); Limón, Sector Cerro Cocori, Fca. de E. Rojas, 150 m, xii.1992, L_N_286000_567500, INBio CRI000961112 (1♀, INBio); next four same as preceding, but 12.iv–19.v.1992, INBio CRI000469958 (1♀, INBio); 9–30.xi.1992, INBio CRI000862271 (1♂, INBio); 12–31.viii.1992, INBio CRI000760508 (1♂, INBio); viii.1992, INBio CRI000581661 (1♂, INBio); x.1991, INBio CRI000462179 (1♂, INBio); Valle de la Estrella, Reserva Biológica Hitoy Cerere, Sendero Toma de Agua, 140 m, 8.v.1999, F. Umaña, L_N_184300_643500, #54234, INBio CRI0003704896 (1♂, INBio); Valle de la Estrella, Reserva Biológica Hitoy Cerere, Sendero Toma de Agua, 100 m, 19.x–19.xi.2000, F. Umaña, L_N_184300_643500, #60668, INBio CRI0003705086 (1♂, INBio); Reserva Biológica Hitoy Cerere, Estación Hitoy Cerere, Send. Bobocara, 300 m, 19.x–19.xi.2000, F. Umaña, Malaise L_S_184550_641800, # 60669 (1♀, MZCR); Puntarenas, Golfito, Jiménez, Parque Nacional Corcovado, Río Corcovado, 50 m, 22.iii.2001, J.

Azofiefa, Malaise, L_S_503500_282500, # 61709 (1♂, USNM); Golfito, Estación Agujas, Cerro Rincón, 645–745 m, 15.iv–v.2000, J. Azofiefa, L_S_275500_521950, #56675, INBio CRI0003705092 (1♂, INBio); Golfito, Parque Nacional Corcovado, Estación Agujas, Charcos, 600 m, 17.iv–16.v.1999, J. Azofiefa, L_S_276350_523500, #52776, INBio CRI0003704891 (1♂, INBio); Parque Nacional Corcovado, Estación Sirena (ACOSA), 1–100 m, 5–23.iv.1995, A. Picado, L_N_270500_507900, #4552, INBio CRI000218418 (1♀, INBio); Parque Nacional Corcovado, Estación Sirena, 0–100 m, xi.1993, G. Fonseca, L_S_270500_508300, #2490, INBio CRI000625202 (1♀, INBio); Parque Nacional Corcovado, Queb. La Bonanza, 500 m, 15.iii–28.iv.2001, L_S_524800_275700, #62430, INBio CRI0003704902 and INBio CRI0003704906 (2♂, INBio); RF Golfo Dulce, 24 km W. Piedras Blancas, 200 m, vi–vii.1991, P. Hanson (1♀, USNM), ix.1992 (1♀, MZCR), iii–vi.1990 (1♀, 2♂, USNM), vi–viii.1989 (1♀, USNM), xi.1990 (1♀, MZCR), iii.1992 (1♀, MZCR); Golfo Dulce, 24 km W. Piedras Blancas, 200 m, vi–viii.1989, P. Hanson (1♂, BMNH); Golfo Dulce, 10 km W. Piedras Blancas, 100 m, iii–v.1989, P. Hanson (1♀, BMNH); Península de Osa, Rancho Quemado, 200 m, 12–24.v.1993, A. Gutiérrez, L_S_292500, 511000, INBio CRI001189470 (1♂, INBio); P. N. Manuel Antonio, Quepos, 80 m, v–vi.1991, G. Varela and R. Zuniga, L_S_370900_448800 #7441 (2♀, 1♂, INBio).

Etymology.—This species is named for Antonio Azofiefa, an excellent INBio parataxonomist, whose assistance in the field and perceptive collecting has been a great help to us in conducting our research.

Host.—Unknown.

Distribution.—Costa Rica.

Isosomodes colombia Gates and Hanson, n. sp.
(Figs 22, 66, 79)

Female holotype.—Body length 5.1 mm. **Color:** golden—face, scape, gena dorsally, postgena, pronotum, fore legs, mesoscutum, middle legs, mesopleuron dorsally, scutellum in anterior 2/3, metatarsus, tip of ovipositor sheaths; pale yellow—metafemur, Gt3 except thinly brown anteriorly and posteriorly; black—vertex, occiput dorsally, scutellum laterally and in posterior 1/3, propodeum, petiole, Gt1;

brown—lower face faintly suffused, malar space, pedicel, flagellum, pro- and metafemora suffused basally, collum, mesopleuron in ventral 2/3, metacoxae, metafemora with faint spot apicolaterally, metatibiae, Gt2, Gt4–Gt7 (Fig. 22). **Head:** 1.3× as broad as high, clypeus with radiating carinae sparse, fine, margin straight; anterior tentorial pits small; intertorular space elongate sharply triangular, with 1–2 setae along midline, dorsally continuous as intrascrobal lamina in basal fourth scrobal depression, carina absent in dorsal three-fourths; malar space 0.4× eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellocular distance:postocellar distance as 10:5:22. Antenna with scape barely reaching ventral margin of anterior ocellus; ratio of scape (minus radicle): pedicel:anellus:F1:F2:F3:F4:F5:F6:club as 33:10:2:17:14:14:13:13:11:22; funicles longer than broad; F1 slightly narrowed basally, MPS present in basal 1/3; clava bisegmented, fused, apically slightly truncate and pilose. **Mesosoma:** 2.3× as long as broad, pronotum 0.9× as long as broad, mid lobe of mesoscutum 1.3× as long as broad, scutellum about as long as broad; axillar grooves deep posteriorly, apparently internalized anteriorly and not visible; mesopleuron foveolate anteriorly, bordered by irregular foveae, becoming glabrous posteroventrally and striate posterodorsally; metapleuron umbilicately punctate; propodeum with distinct median groove composed of line of asetose foveae delimited laterally carinae; ratio metatibia: metatarsomeres as 98:35:15:10:8:10; ratio marginal vein:postmarginal vein:stigmatal vein as 20:80:41 (Fig. 79). **Metasoma:** bluntly tapered in lateral view, ovipositor directed horizontally; gastral petiole 0.8× as long as broad, dorsally rugose and produced anterodorsally into a transverse carina; gaster about 3.0× as long as high, ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 23:10:55:60:45:55:30:14.

Male.—Body length 4.3 mm. **Color:** as for female, except scape with slightly swollen area apically, flagellum becoming pale

brown apically, beginning with F5. Sculpture as for female. Flagellomeres pedicellate with a whorl of erect setae apically and basally, each about $3.0\text{--}4.0\times$ as long as width of flagellomere; ratio scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:club as $33:8:1:21:28:28:25:20:23$ (Fig. 66). Gastral petiole $2.1\times$ as long as broad, broadest medially, finely rugulose dorsally, subequal in length to metacoxa; ratio Gt1–Gt7 (all measured dorsally): $20:25:40:33:35:28:10$.

Variation.—The female paratype has the scutellum black and the band on Gt2 narrower dorsally and is missing the left flagellum. The male paratype is missing the left flagellum beyond F1 and one fore leg is mounted separately on the same point.

Type specimens.—Holotype ♀ (IAVH): COLOMBIA, Amazonas, Parque Nacional Natural Amacayacu Matamata, San Martín, 150 m, $3^{\circ}23'01''\text{N}$ $70^{\circ}06'01''\text{W}$, 10–18.X.2000, B. Armado, M.835.

Paratypes, 1♀, 1♂ (USNM): same data as for holotype except dates: 2–10.X.2000 (1♀); 1–8.IX.2000 (1♂).

Etymology.—This species is named for its country of origin, Colombia.

Host.—Unknown.

Distribution.—Colombia.

Isosomodes gigantea (Ashmead)
(Figs 21, 59, 67–70)

Isosoma gigantea Ashmead 1886: 127. Holotype ♂, by monotypy [Jacksonville, FL].

Isosomodes gigantea: Ashmead 1894: 332 [In: Riley et al. 1894].

Isosomodes brasiliensis Ashmead 1904: 460–461. Lectotype ♀, designated below, (USNM). N. syn.

Male holotype.—Body length 4.1 mm. **Color:** brown except following areas golden—scape, anterolateral pronotum, fore and middle leg, hind leg distad coxa, tegulae (Fig. 73). **Head:** $1.3\times$ as broad as high, few fine carinae radiating from clypeus; clypeus shallowly notched; supra-clypeal area with fine elongate reticulation;

anterior tentorial pits present, small; malar space $0.7\times$ eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellular distance:postocellar distance as $8:11:24$. Antenna with scape reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:F6:club as $30:8:2:33:25:22:24:22:22:30$; funicles elongate, parallel sided, F1 MPS absent in basal $1/2$; F2–6 with two sparse, irregular rows of plate sensilla; clavomeres fused. **Mesosoma:** $2.3\times$ as long as broad, pronotum $0.8\times$ as long as broad, mid lobe of mesoscutum $1.8\times$ as long as broad, scutellum approximately as long as broad; notauli impressed anteriorly, obliterated posteriorly, axillar grooves deep posteriorly, internalized anteriorly and not visible; femoral depression subfoveolate; metapleuron deeply foveate; propodeum foveate with indistinct median groove composed of line of asetose foveae delimited laterally by setose foveae; ratio metatibia: metatarsomeres as $95:45:15:10:8:15$; ratio marginal vein:postmarginal vein:stigmatal vein as $32:60:45$. **Metasoma:** evenly tapered in lateral view; gaster $2.3\times$ as long as high, gastral petiole $2.0\times$ as long as broad, carinate-rugose dorsally (Fig. 67); ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): $20:17:32:46:23:50:18:10$.

Female.—Body length 4.2 to 6.0 mm. **Color:** as for male, except pedicel–F5 golden, only F6+clava brown. Flagellar segments (Fig. 68) elongate to quadrate and of uniform width, evenly covered with decumbent setae each $\sim 1.0\times$ as long as width of corresponding segment; ratio scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:F6:club as $34:10:3:18:15:15:14:13:11:20$. Gastral petiole $0.75\times$ as long as broad, broadest medially, rugulose dorsally and ventrally (Fig. 67), $0.5\times$ length of metacoxa; ratio of petiole (dorsal length measured in lateral view), Gt1–Gt7 and ovipositor sheaths (all measured dorsally): $16:25:30:42:40:70:23:8$.

Diagnosis.—This species is most similar to *I. similis*, but is separated by having a

shorter petiole in the female and male flagellomeres brown versus a petiole $>1.0\times$ as long as broad.

Variation.—Female length ranges 4.0–6.5 mm. The body coloration across all specimens is uniformly dark brown to black with occasional infuscation on the legs and flagellomeres.

Type specimen of I. gigantea.—Holotype ♂, by monotypy (USNM): UNITED STATES, Florida, Jacksonville, Type No. 2839 U.S.N.M.

Type specimens of I. brasiliensis.—Lectotype ♀, here designated (USNM): May, Corumba, Type No. 8077 U.S.N.M. (Brazil) (missing right antenna beyond F3, left antenna beyond F2).

Paralectotypes, 2♀ (USNM), same data as for lectotype. Note: Five specimens were indicated in Ashmead's original description, but the other two former syntypes have not been located.

Other specimens examined.—COSTA RICA, Alajuela, Chiles de Aguas, Zarcas Café, 300 m, xii.1989, R. Céspedes (1♀ MZCR); Finca La Selva, NE Dos Rios, 400 m, 27.iii.1988, Hanson (2♂ MZCR); Inst. Tec. Santa Clara, 150 m, 24.iii.1989, Hanson & Godoy (1♂ MZCR); Guanacaste, Cerro el Hacha, NW Volcán Orosi, 300 m, 1988 (7♀ MZCR); Estación Mengo, SW Volcán Cacao, 1100 m, 1988–1989 (1♀, 1♂ MZCR); same data but ix–x.1989 (1♀ MZCR); v.1988 (1♀ MZCR); Santa Rosa National Park, Hacienda 1-0 (1♀ MZCR); same data but i.1987, Gauld (2♀ BMNH); Santa Rosa National Park, Hacienda 4-C, xii.1986–1.1987 (1♀ MZCR); Heredia, 3 km S. Puerto Viejo, OTS-La Selva, 100 m, x.1992, P. Hanson (1♀ MZCR); Puntarenas, Península de Osa, 5 km N. Puerto Jiménez, 10 m, iii–iv.1991, Hanson & Godoy (1♀ BMNH); same data but collector Hanson and dates: i.1992 (1♀ BMNH); iii.1992 (1♀ BMNH); iv.1992 (1♀ BMNH); iv.1993 (1♀ BMNH); v.1993 (1♀ BMNH); RF Golfo Dulce, 24 km W. Piedras Blancas, 200 m, iii.1992, P. Hanson (1♀ MZCR). COLOMBIA, Armenia Quindio, 8.viii.1974, R. Cárdenas, ex cricket egg (1♀, USNM). DOMINICA, Castle Comfort, 12.ix.1965, D.L. Jackson, Bredin-Archbold-Smithsonian Biological Survey (1♂, USNM). HONDURAS, La Ceiba, 6.viii.1916, F.J. Dyer, Sweep weeds, No. 8743 to 8872 (3♀, 4♂, USNM). PANAMA, Fort Clayton, xii.1946, N.L.H. Krauss (1♀, USNM). SAINT VINCENT AND THE GRENADINES, St. Vincent, H.H. Smith (1♀, USNM). TRINIDAD

AND TOBAGO, Goldborough, 19–26.v.1994, M. J. Sommeijer, malaise trap in neglected citrus orchard bordering on primary forest (6♀, USNM), same data with different dates: 17.ii–26.v.1994 (11♀, 2♂, USNM); 24.ii–3.iii.1994 (8♀, 4♂, USNM); 24–31.iii.1994 (1♀, USNM); 31.iii–17.iv.1994 (3♀, 1♂, USNM); 14–21.iv.1994 (1♀, 2♂, USNM); 21–28.iv.1994 (6♀, USNM); 28.iv–5.v.1994 (3♀, USNM); 5–12.v.1994 (1♂, USNM). UNITED STATES, Florida, Jacksonville (2♂, USNM); District of Columbia (1♀, 1♂, USNM); Maryland, Mayo Beach, 30.vii.1944, H.K. Townes (1♂, USNM). VENEZUELA, Zulua, El Tucuco, 45 km SW Machiques, 5–6.vi.1976, A. Menke and D. Vincent (1♂, USNM); 6 km W La Concepcion, 18.vi.1976, A. Menke and D. Vincent (1♂, USNM); Los Angeles del Tucuco, 16.iv.1981, E. Grissell, sweep rain forest (1♀, 1♂, USNM); Tucupido, El Maracay [handwriting difficult to read], 22.v.1957, C.J. Rosales, ex egg of *Bucrates capitatus* (3♀, 2♂, USNM).

Host.—Reared eggs of *Bucrates capitatus* (Orthoptera: Tettigoniidae).

Distribution.—Colombia, Dominica, Honduras, Panama, Saint Vincent and The Grenadines, Trinidad and Tobago, United States (Florida, Maryland), and Venezuela.

Isosomodes landoni Gates and Hanson, n. sp.
(Figs 23, 62)

Female holotype.—Body length 4.5 mm. Color: golden except the following brown—clava and propodeum anterolaterally (Fig. 23). Head: $1.3\times$ as broad as high, clypeus with radiating carinae absent, smooth; anterior tentorial pits small; malar space $0.6\times$ eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellular distance:postocellar distance as 9:11:23; antenna with scape barely reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus: F1:F2: F3:F4:F5:F6:club as 35:12:2:22:15: 15:14:12:10:16; funicles longer than broad; F1 slightly narrowed basally, MPS absent in basal $1/3$; clava bisegmented, fused, apically radially pilose. Mesosoma: $2.4\times$ as long as broad, pronotum about as long as broad, mid lobe of mesoscutum $1.3\times$ as

long as broad, scutellum about as long as broad; axillar grooves deep posteriorly, apparently internalized anteriorly and not visible; mesopluron foveolate anteriorly, bordered by irregular foveae, becoming glabrous posteroventrally and striate posterodorsally; metapleuron umbilicately punctate; propodeum with distinct median groove composed of line of asetose foveae delimited laterally carinae; ratio metatibia: metatarsomeres as 105:38:15:10:5:15; ratio marginal vein:postmarginal vein:stigmatal vein as 30:62:28. Metasoma: bluntly tapered in lateral view, ovipositor directed horizontally; gastral petiole 1.1× as long as broad, dorsally rugose and produced anterodorsally into flattened, faintly pointed carina; gaster about 3.9× as long as high, ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:28:28:45:32:40:16:3.

Male.—Body length 4.4–4.7 mm. Color: as for female, except flagellum brown. Sculpture as for female. Flagellomeres (Fig. 62) filiform with 5–6 whorls of erect setae each about 2.0× as long as width of flagellomere; ratio scape (minus radicle): pedicel:anellus:F1:F2:F3:F4:F5:F6:club as 35:10:2:32:30:25:24:24:24:30. Gastral petiole 2.0× as long as broad, broadest medially, rugulose-reticulate dorsally with irregular carina posteroventrally, subequal in length to metacoxa; ratio Gt1–Gt7 (all measured dorsally): 20:30:41:44:28:20:10.

Variation.—Female length ranges 3.4–5.5 mm.

Type specimens.—Holotype, ♀ (USNM): UNITED STATES, Maryland, Calvert County, American Chestnut Land Trust, Warrior's Rest Sanctuary, 38.5360641–76.5175095, 28.vii–12.viii.2006, M. Gates, Malaise trap residue.

Paratypes, 6♀, 2♂ (USNM): same data as for holotype (6♀, 1♂); North Carolina, Onslow Co., Ashe Island, 19 Aug. 1975, J. C. Dukes, on *Spartina cynosuroides* (1♂).

Etymology.—This species is named for Landon Gates, the youngest son of MG.

Host.—Unknown. Possible hosts include several species of *Conocephalus* and *Orchelimum* (Orthoptera: Tettigoniidae) associat-

ed with habitats along the Atlantic seaboard where they oviposit in stems of various grasses and sedges.

Distribution.—United States (Maryland and North Carolina).

Isosomodes nigriceps Ashmead
(Figs 24, 63)

Isosomodes nigriceps Ashmead 1904: 461. Holotype ♂, by monotypy. Santarem, Brazil (USNM).

Male holotype.—Body length 2.5 mm. Color: golden except the following brown—vertex and scrobal depression dorsally (Fig. 24). Head: 1.3× as broad as high, clypeus with radiating carinae absent, smooth; anterior tentorial pits small; malar space 0.6× eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellocular distance:postocellar distance as 9:11:23; antenna with scape barely reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:[F5:F6:club; missing in lectotype] as 35:12:2:22:15:15:14; funicles longer than broad, pedicellate with a basal and an apical whorl of erect setae each 2–3× as long as width of segment. Mesosoma: 2.4× as long as broad, pronotum about as long as broad, mid lobe of mesoscutum 1.3× as long as broad, scutellum about as long as broad; axillar grooves deep posteriorly, apparently internalized anteriorly and not visible; mesopluron foveolate anteriorly, bordered by irregular foveae, becoming glabrous posteroventrally and striate posterodorsally; metapleuron umbilicately punctate; propodeum with distinct median groove composed of line of asetose foveae delimited laterally carinae; ratio metatibia: metatarsomeres as 105:38:15:10:5:15; ratio marginal vein:postmarginal vein:stigmatal vein as 30:62:28. Metasoma: [missing in holotype].

Female.—Unknown.

Type specimen.—Holotype ♂ (USNM): BRAZIL, Santarem, H. H. Smith coll., Type No. 60508 USNM. This specimen is also missing its right antenna beyond the anellus, right fore

leg, left fore leg, tarsomeres 3–5, left middle and hind legs and right hind leg beyond coxa. Originally indicated as described from a single specimen (Ashmead 1904).

Host.—Unknown.

Distribution.—Brazil.

Isosomodes paradoxus Gates and Hanson, n. sp.
(Figs 25, 57–58)

Female holotype.—Body length 5.7 mm. Color: golden except the following black—ocellar triangle, median line on pronotum and mesoscutum, propodeum medially, metasternum, midline Gt1–Gt4, Gt4 in apical 1/2 through Gt7 (Fig. 25). Head: 1.3× as broad as high primarily reticulate with few irregular, shallow umbilicae, malar space and gena finely reticulate with umbilicae more widely spaced, clypeus acarinate, smooth, shallowly bilobate; anterior tentorial pits small; intertorular space elongate triangular, with a few setae along midline, dorsally continuous as intrascrobal lamina in basal fifth scrobal depression, carina fading dorsally; malar space 0.4× eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellular distance:postocellar distance as 10:8:25, ocellar triangle depressed. Antenna with scape exceeding ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus: F1:F2:F3:F4:F5:F6:club as 35:18:5:21:19:19:16:14:22; funicles longer than broad; F1 slightly narrowed basally, MPS absent in basal fifth; clava bisegmented, fused, apically radially pilose. Mesosoma: 2.4× as long as broad, pronotum 0.7× long as broad, mid lobe of mesoscutum 1.8× as long as broad, scutellum about as long as broad; axillar grooves deep posteriorly, apparently internalized anteriorly and not visible; mesopleuron foveolate anteriorly, bordered by irregular foveae, becoming glabrous posteroventrally and striate posterodorsally; metapleuron umbilicately punctate; propodeum with distinct median groove composed of line of asetose foveae delimited laterally carinae; ratio metatibia: metatarsomeres as 104:44:15:10:8:15; ratio

marginal vein:postmarginal vein:stigmatal vein as 25:60:36. Metasoma: bluntly tapered in lateral view, ovipositor directed horizontally; gastral petiole 1.2× as long as broad, dorsally rugose, submedially bicarinate; gaster about 4.0× as long as high, ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:30:43:50:37:70:23:8.

Male.—Unknown.

Type specimen.—Holotype, ♀ (USNM): ECUADOR, Napo, Tiputini Biodiversity Station, 216 m, 00°37'55"S, 76°08'39"W, 6.ii.1999, T. Erwin et al., fogging of mostly bare green leaves, some with covering of lichenous or bryophytic plants, Lot # 2068.

Etymology.—This species is named for its paradoxical nature in sharing certain diagnostic features of both *Isosomodes* and *Bephrata*.

Host.—Unknown.

Distribution.—Ecuador.

Isosomodes parkeri Gates and Hanson, n. sp.
(Figs 26, 64–65)

Female holotype.—Body length 5.7 mm. Color: golden except the following black—flagellum, vertex excluding spot posterolaterad lateral ocellus, pronotum dorsally, mesoscutum excluding lateral 1/2 lateral lobe, mesopleuron ventrally, metapleuron, scutellum, metacoxa laterally and mesally, propodeum, petiole, Gt1–Gt6 dorsally, syntergum in dorsal 2/3, ovipositor sheaths apically (Fig. 26). Head: 1.4× as broad as high, clypeus with fine radiating carinae; anterior tentorial pits small; malar space 0.6× eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellular distance:postocellar distance as 9:12:22. Antenna with scape barely reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus: F1:F2: F3:F4:F5:F6:club as 30:12:2:21:15:15: 14:14:12:19; funicles longer than broad; F1 slightly narrowed basally, MPS absent in basal 1/3; clava bisegmented, fused, apically radially pilose. Mesosoma: 2.4× as long as broad, pronotum about as long as

broad, mid lobe of mesoscutum $1.3\times$ as long as broad, scutellum about as long as broad; axillar grooves deep posteriorly, apparently internalized anteriorly and not visible; mesopleuron foveolate anteriorly, bordered by irregular foveae, becoming glabrous posteroventrally and striate posterodorsally; metapleuron umbilicately punctate; propodeum with distinct median groove composed of line of asetose foveae delimited laterally carinae; ratio metatibia: metatarsomeres as 104:44:15:10:8:15; ratio marginal vein:postmarginal vein:stigmatal vein as 25:60:36. Metasoma: bluntly tapered in lateral view, ovipositor directed horizontally; gastral petiole $1.2\times$ as long as broad, dorsally rugose, submedially bicarinate; gaster about $4.0\times$ as long as high, ratio of Gt1–Gt7, ovipositor sheath (all measured dorsally): 25:30:43:50:37:70:23:8.

Male.—Body length 4.4 mm. Color: as for female (Fig. 64), except flagellum brown. Sculpture as for female. Flagellomeres (Fig. 65) filiform with numerous erect setae each about $1.0\times$ as long as width of flagellomere; ratio scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:F6:club as 30:10:2:37:28:28:25:24:2:30 (Fig. 65). Gastral petiole $2.4\times$ as long as broad, broadest medially, rugulose dorsally and ventrally, subequal in length to metacoxa; ratio Gt1–Gt7 (all measured dorsally): 20:26:22:32:16:20:11.

Variation.—Female length ranges 5.5–5.7 mm, but vary little in coloration.

Type specimens.—Holotype, ♀ (USNM): UNITED STATES, Maryland, Calvert County, American Chestnut Land Trust, Warrior's Rest Sanctuary, 38.5360641–76.5175095, 28.vii–12.viii.2006, M. Gates, Malaise trap residue.

Paratypes, 3♀, 1♂ (USNM): same data as for holotype.

Etymology.—This species is named after William Parker, one of the original founders (in 1649) of Anne Arundel County, Maryland. The watershed with which this species is associated, Parker's Creek, is named after him.

Host.—Unknown. Possible hosts include several species of *Conocephalus* and *Orche-*

limum (Orthoptera: Tettigoniidae), that are associated with habitats along the Atlantic seaboard where they oviposit in stems of various grasses and sedges.

Distribution.—United States (Maryland).

Isosmodes similis Gates and Hanson, n. sp.
(Figs 71–74)

Female holotype.—Body length 5.2 mm. Color: brown except following areas golden—scape, pedicel, F1–F5, anterolateral pronotum, tegula, fore leg, middle leg, metasomal leg except basal $\frac{3}{4}$ metacoxa (Fig. 72). Head: $1.3\times$ as broad as high, few fine carinae radiating from clypeus; clypeus shallowly notched; supraclypeal area with fine elongate reticulation and setigerous foveae; anterior tentorial pits present, small; malar space $0.6\times$ eye height; scrobal basin carinate laterally; ratio of lateral ocellus:ocellular distance:postocellar distance as 10:10:18. Antenna with scape reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus: F1:F2: F3:F4:F5:F6:club as 33:15:2:20:15: 15:14:12:30; funicles elongate; F1 slightly narrowed basally, MPS absent in basal $1/3$; F2–5 with two or more staggered rows of plate sensilla. Mesosoma: $2.7\times$ as long as broad, pronotum $0.9\times$ as long as broad, mid lobe of mesoscutum $1.8\times$ as long as broad, scutellum approximately as long as broad; notauli impressed anteriorly, obliterated posteriorly, axillar grooves deep posteriorly, internalized anteriorly and not visible; femoral depression rugulose subfoveolate; metapleuron deeply foveate; propodeum foveate with indistinct median groove composed of line of asetose foveae delimited laterally by setose foveae; ratio metatibia: metatarsomeres as 90:38:15:10: 8:10; ratio marginal vein:postmarginal vein:stigmatal vein as 33:73:35. Metasoma: evenly tapered in lateral view, ovipositor parallel to horizontal; gaster $2.7\times$ as long as high, gastral petiole $1.5\times$ as long as broad, asetose dorsolaterally, dorsally rugulose (Fig. 71); ratio of Gt1–Gt7, oviposi-

tor sheath (all measured dorsally): 15:20:43:45:35:70:20:10; hypopygium reaching $0.5\times$ length of gaster, apical region of ventral line with 3 pairs of setae.

Male.—Body length 4.2 to 5.5 mm. **Color:** as for female except F6 brown and metafemur brown. Flagellar segments (Fig. 73) elongate and of uniform width, evenly covered with suberect setae each $\sim 1.0\times$ as long as width of corresponding segment; ratio scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:F6:club as 30:10:2:32:26:24:22:20:20:26. Gastral petiole $2.0\times$ as long as broad, broadest medially, rugulose dorsally and ventrally (Fig. 74), with row of two anteriorly-directed setae present dorsolaterally, $0.8\times$ length of metacoxa; ratio of petiole (dorsal length measured in lateral view), Gt1–Gt7 (all measured dorsally): 45:40:20:20:25:20:20:11.

Diagnosis.—This species is most similar to *I. gigantea*, but is separated by the length of the female petiole. The males are similar to *I. landoni*, except the flagellomeres are asymmetrically sided with setae $2\text{--}3\times$ the length of the corresponding segment (parallel-sided and $\leq 2\times$ in).

Variation.—Female length ranges 3.8–6.5 mm. The body coloration across all specimens is uniformly dark brown to black with occasional infuscation on the legs (particularly the metafemur) and flagellomeres. Although not seen in the holotype, most females possess two fine setae anterodorsally on the petiole

Type specimens.—Holotype, ♀ (USNM): COSTA RICA, Heredia, 3 km S. Puerto Viejo, OTS-La Selva, 100 m, x.1992, P. Hanson.

Paratypes, 25♀, 19♂: 7♀, 8♂: same data as holotype (1♀ USNM); different dates: ix.1992 (2♀, 1♂ USNM); iii–iv.1993 (3♀, 3♂ USNM); iv–v.1993 (1♀, 1♂ USNM); vi.1993 (1♂ USNM); different dates and collectors (Hanson & Godoy): ii–iv.1993 (3♂ USNM); F. La Selva, 3 km S Puerto Viejo, 10°26'N 84°01'W, 26.iii.1984, H. A. Hespeneheide, at foliar nectaries *Byttneria aculeata* (1♀ USNM); Estación Biológica La Selva, 50–150 m, 10°26'N 84°01'W, Proyecto ALAS, INBio-OET, M/01/320,

15.i.1994, parcelas sucesionales (1♀, INBio); Estación Biológica La Selva, 50–150 m, 10°26'N 84°01'W, INBio -OET, i.2000, CRI002623432 (1♀, INBio); same data but, xii.1999, CRI002623420 (1♀, 1♂ INBio); Chilamate, 75 m, 4.ii.1989, Hanson & Godoy (1♂ USNM); Alajuela, Res. Biológica Alberto Brenes (San Ramon), 900 m, viii–ix.1995 (5♀, 2♂ MZCR); same data but vii–viii.1995 (1♀ MZCR); Estación Biológica San Ramón, viii–ix.1995 (3♀, 3♂ MZCR); same data but vii–viii.1995 (1♀, 1♂ MZCR); Cartago, Rio Chitara, NE de Jabilos, 750 m, 28.iv.1988, P. Hanson (1♂ USNM); Guanacaste, Estación Pitilla, 9 km S. Santa Cecilia, 700 m, vi.1988, P. Hanson (1♀ MZCR); same data but v.1988 (1♀ MZCR); Limón, 16 km W. Guapiles, 400 m, vii–ix.1990, P. Hanson (1♀ MZCR); sur de Iriquois, 300 m, 23.v.1987, P. Hanson (1♂ USNM); Los Diamantes, Guapiles, 200 m, 20.v.1988, P. Hanson (1♂ USNM); Puntarenas, Parrita playa, 13.i.1989, P. Hanson (1♀ USNM);

Etymology.—This species is named after its similarity to *I. gigantea*.

Host.—Unknown.

Distribution.—Costa Rica.

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